Analysis Influence: Learning True False Learning Model Based Domino Cards on Student Learning Outcomes

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Article Info

ABSTRACT

Purpose of the study: This study aims to determine the learning outcomes of students using and not using the True or False learning strategy based on domino cards on the reproductive system material in class XI science at Public High School 8 Bandar Lampung.

Methodology: This type of research is a quasi-experimental research with a Pretest-Posttest Control Group Design research design. The sampling technique in this study was purposive sampling of 72 students. The data collection technique was carried out using 20 multiple-choice test instruments. The data analysis technique was carried out using descriptive analysis techniques and inferential analysis techniques.

Main Findings: The results showed that classes that used the True or False learning strategy based on domino cards had higher average scores than classes that did not use the strategy. Regression analysis indicated a significant influence of this learning strategy on the learning outcomes of class XI science students at Public High School 8 Bandar Lampung, with a calculated t value greater than the t table and a significance level of 0.05.

Novelty/Originality of this study: The novelty of this research can lie in the innovative approach in using the "True or False" learning strategy based on domino cards to understand and improve student learning outcomes in studying complex material such as Coordination Systems. This approach can be an interesting new step because it combines two different elements.

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1. INTRODUCTION

Education is a conscious effort to develop the potential of Human Resources (HR) through teaching activities. There are two related educational concepts, namely learning and instruction [1], [2]. The concept of learning is rooted in the students and the concept of learning is rooted in the educators. A student is a person or group of people who are seekers and recipients of the lessons they need, while an educator is a person or group of people whose profession is to process teaching and learning activities and a set of other roles that enable effective teaching and learning activities to take place [3], [4]. The human qualities needed by the Indonesian nation in the future are those who are able to face increasingly fierce competition with other nations in the world. The quality of Indonesian people is produced through the provision of quality education.

One of the problems facing the world of education is the weakness of the learning process [5], [6]. In the learning process, children are not encouraged to develop thinking skills. The learning process in the

classroom is directed at the ability to memorize information, children's brains are forced to remember and store various information that they remember to connect it with everyday life. As a result, when children graduate from school, they are smart theoretically, but they are poor in application. Methods are methods used to implement plans that have been prepared in real activities so that the goals that have been prepared are achieved optimally [7]–[9]. The success of implementing a learning strategy really depends on the way the teacher uses learning methods, because a learning strategy can only be implemented through use.

Teachers think about what information and abilities students should have, so at that time the teacher should also think about what strategies should be used so that all of this can be achieved effectively and efficiently. Active learning is learning that invites students to learn actively [10], [11]. With active learning, students are invited to participate in all learning processes, with learning, in this way students will usually feel that the atmosphere is more pleasant so that learning outcomes can be maximized. Active learning strategies consist of many types of learning, one of which is the true or false type. The true or false statement strategy is one of the strategies in active learning that can stimulate student involvement in the subject matter provided [12], [13].

This kind of teaching and learning process continues continuously in the learning system and ultimately causes student learning outcomes to decline. Especially in biology lessons on reproductive system material which requires a lot of conceptual reasoning and experience as well as student involvement in learning. This also has an impact on the test results obtained, where there are still many students who get scores below standard is 70 and have to take remedial measures. The True Or False learning model based on domino cards is expected to make students more active and enthusiastic in participating in the learning process and able to construct their own new knowledge that will be obtained through the learning process. Therefore, learning will be more meaningful so that it can improve student learning outcomes. The success of the teaching and learning process that has been carried out in the classroom is indicated by the increasing learning outcomes obtained by the students, and this research line wiht [14]–[16]. So one of the parties who plays a very important role in efforts to improve student learning outcomes in education is the teacher. It is a teacher who formulates and plans an effective and efficient learning model so that students can meet the minimum completeness criteria as an effort to improve the quality of education in Indonesia. And from several journals, the learning model that approaches the best criteria in fulfilling the minimum completeness criteria is the domino card-based true or false learning model.

The novelty of this research lies in its innovative use of a True or False learning strategy based on domino cards to enhance student learning outcomes in the context of the reproductive system material for class XI Science students at Senior High School 8 Bandar Lampung. While traditional teaching methods often dominate the classroom, this study introduces a gamified approach that leverages the engaging nature of domino cards to facilitate active learning and retention. This unique strategy not only offers a fresh pedagogical tool but also provides empirical evidence on its effectiveness through a quasi-experimental design, thus contributing valuable insights to educational practices and the broader field of instructional strategies.

Based on the results of observations, it shows that the reality in the field still shows that the learning process carried out by teachers in the classroom still focuses on the teacher as the main source of knowledge, which in turn shapes students into objects and loyal listeners in the classroom which results in students not able to develop their potential, talents and abilities. Then lectures become a learning strategy which is the main choice and the one most preferred by educators in carrying out the teaching and learning process. As a result, students become bored and lack motivation to study in class, and cannot remember what they have learned.

The urgency of this research lies in the urgent need to improve student learning outcomes in science, especially in the reproductive system material, which is often considered difficult by grade XI science students at Public High School 8 Bandar Lampung. Traditional learning strategies that are less interactive and uninteresting often fail to motivate students and support deep understanding. Therefore, this study aims to explore and evaluate the effectiveness of the True or False learning strategy based on domino cards as an innovative and interesting alternative. By comparing the learning outcomes of students who use this strategy with those who do not, this study seeks to provide empirical evidence of the positive impact of a more interactive and enjoyable learning method, so that it can be implemented more widely to improve the quality of education.

2.   RESEARCH METHOD
2.1 Research Type
This type of research is quasi experimental design research, namely quasi-experiment. Pseudo-experimental, namely the ability to obtain information that is an approximation of the information that can be obtained by actual experimentation in circumstances where it is not possible to control or manipulate all relevant variables [17], [18]. This type of research is utilized to approximate the information that can be obtained through actual experimentation in situations where it is not feasible to control or manipulate all relevant variables. The

focus of this study is to examine the impact of a True or False learning strategy based on domino cards on student learning outcomes. The design implemented is the Pretest - Posttest Control Group Design, which allows for comparison between an experimental group and a control group to determine the effectiveness of the intervention. This quasi-experimental approach is essential in educational settings where random assignment and complete control over variables are often impractical.

2.2 Population and Sample

The population for this study comprises all students enrolled in class XI Science at Senior High School 8 Bandar Lampung, totaling 266 students. To align with the quasi-experimental design requirements, purposive sampling was employed to select a representative sample that included both a control class and an experimental class. Specifically, class XI science 1, consisting of 36 students, was designated as the control class, while another class of the same grade and subject served as the experimental class. This sampling method ensures that the selected groups are suitable for comparative analysis, allowing the researchers to observe the effects of the intervention with a high degree of relevance to the overall population.

2.3 Data Collection Technique

The primary data collection instrument used in this study was a learning outcomes test. This objective test comprised multiple-choice questions with four alternative answer choices for each item, labeled a, b, c, and d. The test consisted of 20 questions, administered twice to the students—once before the learning intervention (pretest) and once after the intervention (posttest). This approach enabled the researchers to measure the changes in student learning outcomes attributable to the intervention. The test was designed to assess the students' understanding and retention of the reproductive system material, providing a quantitative measure of learning effectiveness.

The instrument used in data collection was a learning outcomes test. This test is a multiple choice objective test with 4 alternative answer choices for each item, namely a, b, c, and d. This test contains 20 questions, which are given twice to students. The first test is given before students enter learning (pretest) and the second test is given after students have carried out learning (posttest). The guidelines used for categorizing data on the results of biology learning participation obtained by students are as follows: namely as follows:

Table 1. Learning Outcome Categories

Intervals	Category
x $<(\mu - 1{,}0\sigma)$	Low
$(\mu - 1{,}0\sigma)\leq$ x $<(\mu + 1{,}0\sigma)$	Currently
$(\mu + 1{,}0\sigma)\leq$ x	High

This research uses descriptive analysis techniques and quantitative analysis techniques. The descriptive analysis here is intended to answer the first and second problems. In addition, descriptive statistical analysis is used to describe the learning outcomes obtained by students, both experimental and control groups. Inferential statistical analysis is used to test the proposed research hypothesis. Inferential statistics or probability is a statistical technique used to analyze sample data and the results are applied to the population [19]–[21]. Inferential statistical analysis is used to test the proposed research hypothesis. The tests in this research are the prerequisite test (normality test) and homogeneity test (simple regression test).

2.4 Data Analysis Technique

To analyze the collected data, both descriptive and inferential statistical techniques were employed. Descriptive analysis was used to address the first and second research questions by summarizing and categorizing the learning outcomes for both the experimental and control groups. This involved describing the distribution of scores and categorizing them into predefined intervals (low, medium, and high) based on standard deviations from the mean. Inferential statistical analysis, specifically simple regression tests, was utilized to test the research hypotheses and determine the statistical significance of the observed differences between the groups. This analysis included prerequisite tests such as normality and homogeneity tests to ensure the validity of the regression results. Inferential statistics enabled the researchers to generalize the findings from the sample to the broader population.

2.5 Research Procedure

The research procedure began with the selection of the population and the purposive sampling of the control and experimental classes. Following this, a pretest was administered to both groups to establish a baseline measurement of student learning outcomes. The experimental group then received the intervention, which involved using the True or False learning strategy based on domino cards, while the control group continued with traditional instruction. After the intervention period, both groups were given a posttest identical

to the pretest. The collected data were then subjected to both descriptive and inferential statistical analyses. Descriptive statistics were used to categorize and describe the learning outcomes, while inferential statistics, including normality and homogeneity tests, and simple regression analysis, were applied to test the research hypotheses and determine the significance of the intervention's impact. This structured procedure ensured a comprehensive evaluation of the learning strategy's effectiveness.

3. RESULTS AND DISCUSSION
3.1. Results

Based on the results of research conducted at Senior High School 8 Bandar Lampung on class

Table 2. Frequency Distribution of Pretest Scores for Experimental Class

Intervals	f_i	f_k	x_i	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$	Percentage (%)
20 – 28	2	2	24	48	612.56	1225.13	5.5
29 – 37	6	8	33	198	248.06	1488.38	16.7
38 – 46	8	16	42	336	45.56	364.50	22.2
47 – 55	9	25	51	458	5.06	45.56	25.0
56 – 64	5	30	60	300	126.56	632.81	13.9
65 – 73	6	36	69	414	410.06	2460.38	16.7
Amount	36	-	-	1754	1447.88	6216.75	100

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i} = 48{,}72 \qquad SD = \sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{n - 1}} = 13{,}85$$

The pretest frequency distribution table for biology learning results in the reproductive system material above shows that there were 2 students who got scores in the interval 20-28, 6 students who got scores in the interval 29-37, 8 students who got scores in the interval 29-37. 38-46, 9 students got a score of 38-46, 9 students got a score in the interval 47-55, 5 students got a score in the interval 47-55, 5 students got a score in the interval 56 -6 eh scores in the interval 56-64, and 6 4, and 6 students who obtained scores in the interval 65-73. Based on the distribution table above, if you categorize the learning outcomes of class

Table 3. Level of material mastery (pretest) of students in the experimental class of Senior High School 8 Bandar Lampung

Intervals	Frequency	Percentage (%)	Category
x < 34.9	6	16.7	Low
34.9 ≤ x < 62.6	24	66.6	Currently
62.6 ≤ x	6	16.7	High

Based on the table above, it can be seen that the students' mastery of the prerequisite material is in the low category, there are 6 students with a percentage of 16.7%. In the medium category there are 24 students with a percentage of 66.6% and in the high category there are 6 students with a percentage of 16.7% so it can be concluded that the experimental class biology learning results are in the medium category.

Based on the results of research conducted at Senior High School 8 Bandar Lampung on class XI science 2 students, the following results were obtained for the frequency distribution of experimental class posttest scores.

Table 4. Frequency Distribution of Posttest Scores for Experimental Class

Intervals	f_i	f_k	x_i	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$	Percentage (%)
70 – 74	4	4	72	280	113.21	452.84	11.1
75 – 79	8	12	75	600	58.37	466.96	22.2
80 – 84	3	15	80	240	6.97	20.91	8.3
85 – 89	12	27	85	1020	5.57	66.84	33.3
90 – 94	4	31	90	360	54.17	216.68	11.1
95 – 99	5	36	95	475	152.77	763.85	14
Amount	36	-	-	2975	391.06	1988.08	100

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i} = 82{,}64 \qquad SD = \sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{n - 1}} = 7{,}88$$

The posttest frequency distribution table of biology learning results on the reproductive system material above shows that there were 4 students who got scores in the interval 70-74, 8 students who got scores in the interval 75-79, 3 students who got scores 80-84, 12 who got a score of 80-84, 12 students who got a score in the interval 85-89, 4 students who got a score in the interval 85-89, 4 students who got a score in the interval 90-94, and 5 students who got a score in the interval 95 -99. Based on the distribution table above, if you categorize the learning outcomes of class

Table 5. Level of mastery of material (posttest) of students in the experimental class of Senior High School 8 Bandar Lampung

Intervals	Frequency	Percentage (%)	Category
x < 74.8	4	11.1	Low
74.8 ≤ x < 90.52	23	63.8	Currently
90.52 ≤ x	9	25.1	High

Based on the table above, it can be seen that the students' mastery of the prerequisite material is in the low category, there are 4 students with a percentage of 11.1%. In the medium category there are 23 students with a percentage of 63.8% and in the high category there are 9 students with a percentage of 25.1%. so it can be concluded that the experimental class biology learning outcomes are in the medium category.

Based on research conducted at Senior High School 8 Bandar Lampung on class XI science 1 students, the results of the frequency distribution of control class pretest scores were obtained as follows.

Table 6. Frequency Distribution of Control Class Pretest Scores

Intervals	f_i	f_k	x_i	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$	Percentage (%)
20 – 26	7	7	23	161	279.56	1956,92	19.4
27 – 33	2	9	30	60	94.48	188.96	5,6
34 – 40	12	21	37	444	7.40	88.80	33.3
41 – 47	5	26	44	220	18.32	91.60	13.9
48 – 54	5	31	51	255	127.24	636.20	13.9
55 – 61	5	36	58	290	334.16	1670.80	13.9
Amount	36	-	-	1430	861.16	4633.28	100

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i} = 39,72 \qquad SD = \sqrt{\frac{\sum f_i(x_i - \bar{x})^2}{n - 1}} = 11,51$$

The pretest frequency distribution table for biology learning results on the reproductive system material above shows that there were 7 students who got scores in the interval 20-26, 2 students who got scores in the interval 27-33, 12 students who got scores 34-40, 5 students got scores in the interval 41-47, 5 students got scores in the interval 48-54, and 5 students got scores in the interval 55-61. Based on the distribution table above, if you categorize the learning outcomes of class

Table 7. Level of material mastery (pretest) of students in the control class of Senior High School 8 Bandar Lampung

Intervals	Frequency	Percentage (%)	Category
x < 28.21	7	19.4	Low
28.21 ≤ x < 51.23	24	66.7	Currently
51.23 ≤ x	5	13.9	High

The results of students' mastery of prerequisite material in the low category were 7 students with a percentage of 19.4%. In the medium category there are 24 students with a percentage of 66.7% and in the high category there are 5 students with a percentage of 13.9%. So it can be concluded that the control class biology learning outcomes are in the medium category.

Based on research conducted at Senior High School 8 Bandar Lampung on class XI science 1 students, the results of the frequency distribution of control class pretest scores were obtained as follows.

Table 8. Frequency Distribution of Control Class Posttest Scores

Intervals	f_i	f_k	x_i	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$	Percentage (%)
60 – 64	9	9	62	558	104.55	940.04	25.00
65 – 69	3	12	67	201	27.25	81.75	8.3
70 – 74	1	13	72	72	0.05	0.05	2.8

75 – 79	14	27	77	1078	22.85	319.88	38.9
80 – 84	4	31	82	328	95.65	382.59	11.1
85 – 89	5	36	87	435	218.45	1092.24	13.9
Amount	36	-	-	2672	468.69	2816.54	100

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i} = 74{,}22 \qquad SD = \sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{n-1}} = 8{,}73$$

The posttest frequency distribution table of biology learning results in the reproductive system material above shows that there were 9 students who got scores in the interval 60-64, 3 students who got scores in the interval 65-69, 1 student who got a score of 70-74, 14 students scored in the 75-79 interval, 4 students scored in the 80-84 interval, and 5 students scored in the 85-89 interval. Based on the distribution table above, if you categorize the learning outcomes of class

Table 9. Level of material mastery (posttest) of students in the control class of Senior High School 8 Bandar Lampung

Intervals	Frequency	Percentage (%)	Category
$x < 65.49$	7	19.4	Low
$65.49 \leq x < 82.95$	24	66.7	Currently
$62.6 \leq x$	5	13.9	High

The results of students' mastery of prerequisite material were in the low category, there were 9 students with a percentage of 25%. In the medium category there are 22 students with a percentage of 61.1% and in the high category there are 5 students with a percentage of 13.9%. So it can be concluded that the control class biology learning outcomes are in the medium category.

In the inferential statistical analysis section to find out whether there is an influence of the use of the domino card-based True Or False Strategy on Student Learning Outcomes in the Reproductive System Material in Em Reproduction in Class XI Science at Senior High School 8 Bandar Lampung. The normality test aims to state whether the biology learning outcome score data on the subject of the reproductive system for each experimental class (XI science 2) and control class (XI science 1) from the population is normally distributed. Testing whether the data in this study is normal or not uses manual analysis with the chi-square test. . The chi-square test is a normality test that is used if the sample size is 30 data or more ($n \geq 30$) [22]–[24]. The chi-square method or normal distribution goodness of fit test uses an approach of adding up deviations from observation data for each class with the expected value. The chi-square technique normality test was used to test the normality of data presented in groups. Based on the results of research conducted at Senior High School 8 Bandar Lampung on class XI Science students.

Based on the distribution table of the experimental class pretest normality test (XI science 2) using the chi-square test, the calculated X_2 value was 87.1389 and the X^2 table value was at a significance of 0.05, namely 7.81, so it can be concluded that the experimental class pretest value data (XI science 2) has a normal distribution because the value of $X^2_{calculated} < X^2_{table}$. Based on the distribution table of the experimental class post-test normality test (XI science 2) using the chi-square test, the chi-square value obtained was $_{calculated} X^2 = -51.0948$ and the X^2_{table} value was at a significance level of 0.05, namely 7.81 So it can be concluded that the pretest score data for the experimental class (XI science 2) the distribution is normally distributed because the value because the value of $X^2_{count} < X^2_{table}$.

Based on the distribution table of the control class posttest normality test (XI science 1) using the chi-square test using the chi-square test, the calculated X_2 value = -27.1274 and the X^2_{table} value at a significance of 0.05 at a significance of 0, 05, namely 7.81, namely 7.81, so it can be concluded that the pretest score data for the control class (XI science 1) is normally distributed because the value of X_2 is $< X^2$. Based on the control class posttest normality test distribution table (XI science 1) above and above using the chi-square test, the $_{calculated X^2}$ value = -27.1274 and the X^2_{table} value at a significance of 0.05, namely 7.81, namely 7.81 So it can be concluded that the pretest score data $_{for}$ the first class (XI science 1) is normally distributed because the value of X^2 is $< X^2$.

The homogeneity test was carried out to determine whether the student learning outcomes data from the two groups for each experimental class (XI science 2) which was taught with the domino card-based True Or False Strategy and the control class (XI science 1) with direct learning were homogeneous or not. The test criteria are if $F_{count} \leq F_{table}$ then the data is categorized as homogeneous and if $F_{count} \geq F_{table}$ then the data is categorized as not homogeneous [25]–[27]. Based on the results of the analysis carried out, it can be obtained that the value of the F test is = 1.19851 at a significance level of 0.05. Because $_{calculated} F(1.19851) \leq _{table F}(1.75)$, H_0 is accepted, which means the data is homogeneously distributed. Based on the results of the hypothesis, t = 297 is obtained, then $t_{=297} > t_{table}(297 > 0.339)$, then H0 $_{is}$ rejected. Thus, this testing decision rejects H_0 and

accepts H $_1$, which means that there is an influence between true or false learning strategies based on domino cards on student learning outcomes in reproductive system material in class .

The results of descriptive analysis of research carried out in experimental classes taught using a domino-based true or false learning strategy with 36 students as respondents, obtained data on student learning outcomes through descriptive analysis with a total of 20 multiple choice questions in the system material. reproduction. Based on the results of pretest data analysis, it shows that the average value is 48.75, the highest value obtained is 70 and the lowest value obtained is 20. The standard deviation value is 13.85. After carrying out the posttest, student learning outcomes increased. The posttest results show an average score of 82.64 with the highest score obtained being 95 and the lowest score obtained being 70. The standard deviation is 7.88.

Based on the data obtained, it can be said that the learning outcomes of class XI science 2 students at Senior High School 8 Bandar Lampung are classified as good and included in the medium category. This is proven by the average score which has increased significantly, where the average pretest score was 48.75, but after being taught using a true or false learning strategy based on domino cards, the average score was 82.64. The results of this research are also supported by the theory which states that domino cards can make students active in the learning process, learning, providing positive effects in the learning process, including stimulating brain activities such as critical thinking, honing creativity, imagination, concentration and media. This can be applied to games so that students don't get bored easily. The involvement of these students is very important to get the final results that meet expectations. Based on the results of the descriptive analysis obtained, it can be concluded that the student learning outcomes of class -average 48.75, while the posttest score obtained an average score of 82.64. So, it was concluded that there was an increase in learning outcomes before and after using the domino card-based true or false learning strategy.

The results of the descriptive analysis of research that was carried out in the control class which was taught without using a domino-based true or false learning strategy with 36 students as respondents, obtained data on student learning outcomes through descriptive analysis with a total of 20 multiple choice questions on the reproductive system material. . Based on the results of the pretest data analysis, it shows that the average value is 39.72, the highest value obtained is 60 and the lowest value obtained is 20. The standard deviation value is 11.51. After carrying out the posttest, student learning outcomes increased. The posttest results show an average score of 74.22 with the highest score obtained being 85 and the lowest score obtained being 30. The standard deviation is 8.73.

Based on the data obtained, it can be said that the learning outcomes of class XI science 1 students at Senior High School 8 Bandar Lampung are quite good and fall into the medium category. This is proven by the average score obtained in the pretest score, namely 39.72 and the posttest score of 74.22. The increase in students' average scores was very small as seen from the results of the pretest and posttest scores. This is because direct learning (lectures) given by the teacher makes students less active in the learning process and tends to be teacher-centered. The results of this research are also supported by the theory which states that the lecture method makes students less motivated in the learning process and only one-way communication occurs, making students participate less and the learning atmosphere is less lively or passive and the communication that grows is only student communication with the teacher or only one just direction. Based on the results of the descriptive analysis obtained, it can be concluded that the learning results of class -average 39.72, while the posttest score obtained an average score of 74.22. So, it was concluded that there was an increase in student learning outcomes who were taught without using a domino-based true or false learning strategy, but the increase was not significant.

During the learning process, students were very enthusiastic about participating in learning activities. All students are actively involved in exchanging opinions and conveying their opinions within their teams. The situation is different when viewed from the control class where learning is carried out using conventional learning. Based on observations, students who are less enthusiastic in the learning process appear bored and tend not to pay attention to the materials given. This influence can also be seen from the results of the inferential statistical analysis that has been carried out. Theoretically, it can be understood that true or false learning based on domino cards is considered capable of making students more active in learning which can stimulate student involvement in the lesson material provided. This strategy is a collaborative activity that can invite students to be involved in direct learning material. This strategy can foster teamwork and exchange opinions.

Domino card-based true or false learning is considered capable of making students more active in learning, this is in accordance with Hendrik Milta Sari's statement which states that the true or false statement strategy is one of the strategies in active learning that can stimulate student involvement in the lesson material provided. . This strategy is a collaborative activity that can invite students to be involved in direct learning learning materials. This strategy can foster teamwork and exchange opinions. The true or false statement strategy requires students to express opinions about whether the statements obtained are true or false, which have previously been discussed in their groups. Students will be more active because they will exchange ideas with

their group members for the success of their group members in answering the questions given with the learning material studied.

An approach that integrates domino card games with a "True or False" format seems to be able to enrich students' learning experience in understanding Coordination Systems material. By utilizing different media and interactive learning styles, this can be an effective way to facilitate a deeper understanding of these concepts [28], [29]. Students can be more involved and active in the learning process, and have the opportunity to respond to the material more intensely through interaction with domino cards that have been adapted to "True or False" questions. It might be a good idea to do a trial run first to see how effective this approach is in improving students' understanding of the material.

One of the significant advantages of this strategy is its ability to change the class dynamic to be more collaborative. Through this session, students are not only passive recipients of information, but also actors in the evaluation and discussion process. When they engage in a specially designed domino card game with a "True or False" format, students are expected to actively examine the truth of existing statements and test their understanding. This approach also provides a platform for the development of critical skills, as students are faced with the task of filtering information and responding to it appropriately, which significantly deepens their understanding of the Coordination Systems material.

However, it is important to recognize that the use of these learning strategies must be carefully adjusted according to student characteristics and the existing classroom situation [30]–[32]. Evaluation of students' ability to absorb Coordination System material, the extent to which this game makes a positive contribution in increasing understanding, as well as the adjustments needed in developing and implementing relevant game strategies, are very important aspects to consider in developing a learning approach that focuses on System material.

This study fills the knowledge line with [33]. That research by exploring the use of domino-based True or False learning strategies in the context of reproductive system learning at the senior secondary education level. While many studies have highlighted the importance of interactive and game-oriented learning strategies in enhancing student engagement and learning outcomes, specific research related to the use of domino cards for the True or False strategy is still limited. By focusing on the population of grade XI science students Public High School 8 Bandar Lampung, this study makes an important contribution to understanding the effectiveness of the strategy in the context of the science curriculum, while identifying potential adaptations and further applications in various schools and educational settings.

The implications of this study indicate that the use of True or False learning strategies based on domino cards can significantly improve student learning outcomes, so that this strategy can be adopted more widely as an effective interactive learning method in the classroom. The application of this strategy can help teachers create a more enjoyable learning atmosphere and support better understanding of the material among students. However, this study has several limitations, such as the limitation in controlling all variables that may affect student learning outcomes and the sample that only includes one school, which may limit the generalization of the findings to a wider population. In addition, this study did not explore the long-term effects of using this learning strategy, so further research is needed to understand the sustainable impact and adaptation in various learning contexts.

4. CONCLUSION

Based on the results of the research and analysis conducted, it can be concluded that the use of the True or False learning strategy based on domino cards is effective in improving student learning outcomes in the reproductive system material in class XI science Public High School 8 Bandar Lampung. This study shows that students who follow learning with this strategy experience a significant increase in their academic achievement compared to students who do not use the strategy. The results of the inferential analysis also confirm the significant positive influence of this strategy on improving students' understanding and mastery of the material. This conclusion supports the importance of introducing innovative and interactive learning methods to improve the quality of education at the public high school level, with broad implications for the development of effective learning practices in other schools.

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