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The healthy diet effect with project based learning animation on student concentration and learning outcomes

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ABSTRACT

A healthy diet affects students' learning concentration to obtain optimal results. If a child eats healthy food, the food is certainly good, good food is not necessarily healthy food. The purpose of the study was to determine the effect of a healthy diet on concentration and learning outcomes assisted by interactive learning videos based on Project Learning at SMA Tamansiswa Binjai. This research was conducted in September 2024. The method used in this research is a quasi-experiment research design with the form of a pretest and posttest control group design. The research population was the XI MIPA class of Tamansiswa Binjai. The Sample was taken using a purposive sampling technique and obtained XI MIPA I as the experimental class. The research instruments used were tests and questionnaires. The data analysis technique used a One-way ANOVA test. Based on data analysis, it can be concluded there is an effect of a learning concentration with a learning outcome in class MIPA I SMA Tamansiswa Binjai.

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INTRODUCTION

Education is a conscious and structured effort to create a learning environment and learning process that allows students to be active in developing their potential. Thus, students are expected to have good spiritual strength, control themselves, have character, be intelligent, have noble character, and have the skills needed for themselves and society (Rahman et al., 2022). Based on the results of a survey on secondary education systems in various countries released by PISA (Program for International Student Assessment) in 2019, Indonesia is ranked low, namely 74th out of a total of 79 countries. In other words, Indonesia's position is in the 6th lowest position compared to other countries. According to Kurniawan, the success of an education system is

influenced by many factors, such as the quality of students, the role of teachers, economic conditions, facilities and infrastructure, and the environment, in addition to other contributing factors (Suncaka, 2023)

One of the main challenges faced today is learning difficulties related to low concentration skills of students. Difficulty in concentrating can prevent them from understanding the material and absorbing lessons optimally, which ultimately impacts their academic results. This problem of learning concentration is increasingly complicated by the rapid development of technology. The presence of electronic devices and social media is a major distraction for students so much of their time is used for activities outside of learning (Kurniawati, 2022)

Produce behavioral changes due to individual interactions with the environment, which take place at the cognitive, affective, and psychomotor levels. In the learning process, students need several factors that support success, one of which is learning concentration (Faizah & Kamal, 2024). Learning concentration is a process that involves behavioral changes, which reflect basic attitudes and values, knowledge, and skills from various fields of study, shown in the form of mastery, application, and evaluation. (Amalia et al., 2022)

Students often face difficulties in maintaining concentration while studying biology for various reasons. One of the main causes is a lack of interest in biology material, which is considered to have many complex concepts and scientific terms that are difficult to understand (Suryanti et al., 2019). As a result, some students feel bored or less interested in taking the lesson seriously. In addition, an unsupportive learning environment, such as a noisy classroom or a lack of attractive learning facilities, can also distract their attention. Physical factors such as fatigue, lack of sleep, or hunger also affect students' ability to stay focused (Azizah & Alberida, 2021)

In this digital age, electronic devices and social media are additional sources of distraction, as students are often tempted to check their phones during the learning process, especially in online classes. The lack of varied teaching methods also contributes to low student concentration, where they feel bored when learning only focuses on lectures without any activities that involve active participation (Wicaksono & Widiyaningrum, 2020). In addition, students' lack of understanding of the importance of biology material in everyday life makes it difficult for them to see the relevance of this lesson to their personal needs or goals, so their motivation to learn and concentrate becomes low (Nasution et al., 2017). Concentration in learning has a very important role in achieving student learning outcomes. With good concentration, students can fully focus on the material being taught, understand concepts in depth, and remember information more effectively (Rizki et al., 2024).

Learning outcomes are achievements obtained through efforts in the learning process and reflect changes in mastery of knowledge, attitudes, and skills. The results achieved by students can be seen through the evaluation given by the teacher after completing the lesson material, as an indicator of the level of student ability in achieving learning objectives(Utami et al., 2019).

Concentration in learning is closely related to healthy eating patterns applied by students. A healthy and nutritionally balanced diet is an important basis for a healthy lifestyle and individual well-being. In a modern lifestyle that is often colored by the consumption of processed foods, fast food, and unhealthy food choices, understanding the importance of healthy food is becoming increasingly crucial (Herlianty et al., 2024). Low learning outcomes in Biology subjects indicate difficulties in understanding the material. Several factors can influence these learning difficulties, which can be grouped into two categories: internal factors and external factors. Internal factors include attitudes toward learning, learning motivation, concentration, material processing, storage of learning outcomes, ability to re-examine knowledge that has been learned, learning achievement, self-confidence, intelligence, and students' learning habits, as well as their ideals (Elijonnahdi et al., 2024). Meanwhile, external factors include the role of teachers in fostering the student learning

process, learning facilities and resources, assessment policies, the student's social environment at school, and the curriculum implemented (Zikra, 2016).

Diet refers to information about the variety and amount of food consumed by a person in a day. An imbalance in diet regulation can cause an imbalance in nutrient intake in the body. (Tobelo et al., 2021). Eating healthy foods has a significant impact on children's growth and development, both physically, cognitively, and mentally, towards a more mature stage. High intake of sugar, salt, carbohydrates, and saturated fat in school-age children can lead to unhealthy eating patterns, which have the potential to result in malnutrition. This can slow physical growth, cause mental disorders, inhibit thinking skills, and make it difficult to concentrate, which of course hurts learning outcomes. The result of an unhealthy diet is a lack of balanced nutritional intake for the brain, which causes brain development to slow down so that concentration decreases and affects the child's intelligence level. A good diet will contribute to improving the concentration of children who are having difficulty learning. Concentration is the most important component in the learning process because when learning, concentration is needed to understand, receive, and process the information received (Udhiyanasari, 2023).

The digestive system is an important aspect of biology that explains how the human body processes food and obtains the nutrients needed for health and development (Liza Nopita, 2022). By understanding the function of the digestive system, students can realize how a healthy diet affects their overall health, including its impact on concentration and learning ability. Poor diet can lead to digestive problems and malnutrition, which have a direct impact on students' physical and mental health, reducing their concentration while studying (Maulani et al., 2024). Therefore, studying the digestive system not only provides students with knowledge of biological processes but also helps them understand the importance of good nutrition to support brain function and improve concentration. This encourages students to pay more attention to their food choices and adopt a healthy diet, which can ultimately contribute to improving their learning outcomes in biology as well as other subjects (Herlianty et al., 2024)

Based on the results of interviews with grade XI Biology teachers, student learning outcomes are still very low in the human digestive system material. According to the results of questionnaires and interviews with students, healthy eating habits and student learning concentration are not optimal. In addition, the teacher's learning methods are still conventional, making students less interested in learning biology, so knowledge of healthy eating patterns needs to be known by students because it has an impact on student concentration and learning outcomes assisted by interactive learning videos.

This study links healthy eating patterns with learning concentration, emphasizing the role of concentration as a link between good nutritional intake and maximum learning outcomes. In addition, the application of interactive learning videos based on Project Based Learning (PjBL) offers an interesting and interactive teaching approach, which can increase student involvement in the learning process. Based on the background above, the author aims to examine the effect of a healthy diet on student concentration and learning outcomes assisted by interactive learning videos based on Project Based Learning (PjBL) at SMA Tamansiswa Binjai. This study is expected to encourage the education system in Indonesia to pay attention to healthy eating patterns, which have an impact on increasing student concentration and learning outcomes so that a healthy and intelligent generation can be realized.

RESEARCH METHODS

Research Design

This research uses a quantitative approach that focuses on collecting and analyzing number-based data. The type of research is a quasi-experimental design with the form of a matching-only

pretest and posttest control group design. This research was conducted at Taman Siswa Binjai Private High School. On the road Jl. Jendral Sudirman No.7b, Tangsi, Kec. Binjai City, Binjai City. Conducted from September 2024. The independent variable of the research is Project-based learning assisted by interactive animated learning videos. Meanwhile, the dependent variables are concentration and student learning outcomes.

Population and Samples

The populations in this study were all XI MIPA classes of SMA Tamansiswa Binjai consisting of four classes. The sample of this study used one class. The sampling technique used in this study was purposive sampling. The samples in this study were XI MIPA 1 class totaling 35 people. The reason for selecting these samples is because class MIPA 1 is based on consideration with the XIth grade Biology teacher. Class MIPA 1 was the experimental class using a project-based learning model.

Instruments

The research instruments used in this study were tests and questionnaires. The test instrument was used to measure the knowledge abilities that students have achieved during the learning process. Learning outcomes using objective tests are in the form of multiple choices consisting of 10 questions that contain 3 indicators. The Healthy Diet questionnaire given to students consists of 4 indicators, Concentration contains 8 indicators. The test instrument used has previously passed the validity test. The validity test obtained is included in the good category.

Procedures

The research procedure consists of three stages that are pra-research stage, implementation, and data processing. In the pre-research stage, researchers made observations of schools that would be used for research, made instruments, and tested research instruments. At the implementation stage, researchers collected data obtained from the pretest and posttest. Learning activities use the project-based learning model for the experimental class. Learning was carried out for 3 meetings on human digestive system material. The last stage is data processing, researchers process data obtained from the field and analyze all research results.

Data Analysis

The data analysis technique used descriptive statistical analysis to find the average class. The research data first went through the prerequisite test stage of analysis normality and homogeneity. The normality test results have a significance value of 0.05, meaning that all data comes from a normally distributed population. Furthermore, the homogeneity shows that all data have homogeneous variances, so the hypothesis test used in this parametric statistical test using the One-Way ANOVA rest. Healthy diet test results, concentration, and learning results can be explained in the following Table 1 categories.

Table 1. Questionnaire Score Category

No.	Category	Value Scale Range
1	Very Good	>80-100
2	Good	>60-80
3	Enough	>40-60
4	Not enough	>20-40
5	Very less	0-20

RESULTS

From the research results, data on the influence of a healthy diet was 64 in the sufficient category, learning concentration was 68 in the good category, and learning outcomes were 84 in the very good category. Data recapitulation is as in Figure 1.

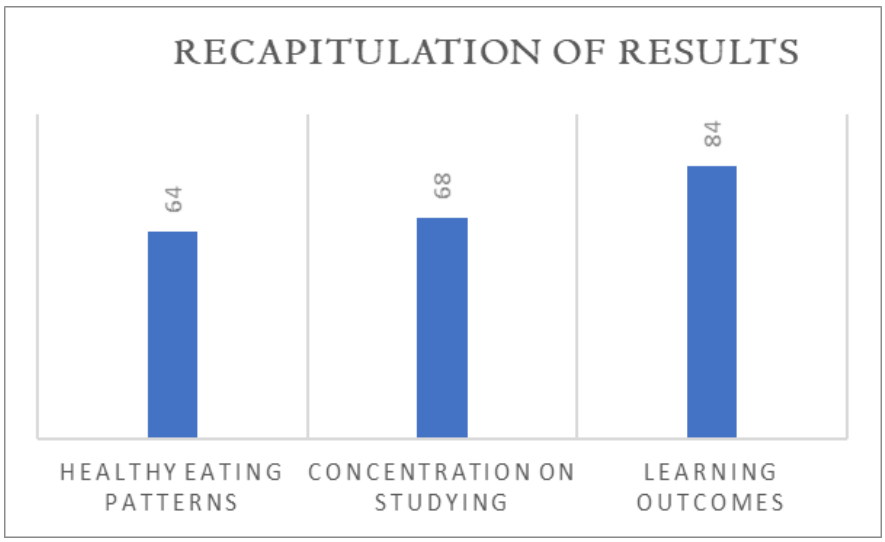

Figure 1. Data recapitulation

Data Linearity Test Results

The results of the ANOVA linearity test are shown in the following Table 2. Based on the results of the linearity test in Table 2 regarding the relationship between Healthy Diet and Study Concentration, it can be seen that the significance value (Sig.) is 0.543. Because this significance value is greater than 0.05, it can be concluded that the variables are linear Healthy Diet and Study Concentration. These results indicate that Healthy Eating Patterns have a linear relationship with students' Learning Concentration, although the F coefficient of 0.377 indicates that the strength of this linear relationship is relatively weak. Overall, it can be concluded that the Healthy Diet variable has a linear influence on Study Concentration, but this influence is not significant at the 0.05 test level.

Table 2. Linearity Test Results for Healthy Diet with Study Concentration

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
I	Regression	96.829	I	96.829	.377	.543[b]
	Residual	8214.936	32	256.717		
	Total	8311.765	33			

a. Dependent Variable: Study Concentration

b. Predictors: (Constant), Healthy Diet

Based on Table 3, the results of the linearity test between Learning Concentration and Learning Outcomes show a significance value (Sig.) of 0.007. Because this significance value is smaller than 0.05, it can be concluded that there is a significant linear relationship between Learning Concentration and Learning Outcomes. The F value of 8.416 indicates that the relationship is quite strong statistically.

Table 3. Linearity Test Results for Study Concentration with Learning Outcomes

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
I	Regression	674.436	I	674.436	8.416	.007[b]
	Residual	2564.535	32	80.142		
	Total	3238.971	33			
a. Dependent Variable: Learning Outcomes						
b. Predictors: (Constant), Study Concentration						

Apart from that, based on the R square value of 0.208, it can be interpreted that Learning Concentration contributes 20.8% to Learning Outcomes. Thus, the better a student's learning concentration, there is a tendency that the student's learning outcomes will also be better. These results show the importance of the concentration factor in achieving optimal learning outcomes.

Table 4. Recapitulation of Data Linearity Test Results

No.	Data	Significant	Information
1.	Healthy Diet with Study Concentration	0,003	Non-Linear
2	Study Concentration with Learning Outcomes	0,0074	Linear

Based on the results of the linearity test in Table 4, it can be concluded that there is a difference in the relationship between the variables "Healthy Diet" and "Learning Concentration" and between "Learning Concentration" and "Learning Outcomes". In Table 4, it can be seen that the significance between "Healthy Diet" and "Study Concentration" is 0.003, which is smaller than 0.05. Therefore, this relationship is categorized as "Not Linear," which indicates that a healthy diet does not have a linear relationship with students' learning concentration.

On the other hand, the relationship between "Learning Concentration" and "Learning Outcomes" has a significance value of 0.0074, which is smaller than 0.05. Therefore, this relationship is categorized as "Linear." This shows that there is a linear relationship between learning concentration and learning outcomes, where increasing learning concentration can have a positive impact on student learning outcomes. Thus, the results of the linearity test show that study concentration has a significant relationship with student learning outcomes, but a healthy diet does not have a linear effect on study concentration.

Regression Test

The regression test results obtained from teaching practitioners with basic teaching skills are as shown in the following Table 5.

Table 5. Regression Test Results

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
I	.456[a]	.208	.183	8.952
a. Predictors: (Constant), Study Concentration				
b. Dependent Variable: Learning Outcomes				

Based on Table 5, the regression test results show an R-value of 0.456, which indicates that there is a moderate correlation between Learning Concentration (predictor variable) and Learning

Outcomes (dependent variable). An R Square value of 0.208 means that Learning Concentration contributes 20.8% to variations in student learning outcomes, while the remaining 79.2% is influenced by other factors not included in this research.

The Adjusted R Square value of 0.183 also supports this interpretation, indicating that the regression model is quite valid in predicting learning outcomes, although several other variables can influence learning outcomes. In addition, the Standard Error of the Estimate value of 8.952 shows the level of error that may occur in predicting student learning outcomes based on learning concentration. Overall, these results indicate that Learning Concentration has a role in improving student learning outcomes, although its contribution is not dominant.

Table 6. Results of Regression Equations and Correlation Coefficients

Data	R^2	Contribution (%)
Concentrate on Learning Results	0,208	20,8

The results in Table 6 show that there is a significant influence between student learning concentration and learning outcomes assisted by video interactive learning media. Because the correlation coefficient (r) value is positive, the higher the student's concentration, the greater the influence on learning outcomes. The coefficient of determination (R^2) of 0.208 indicates that learning concentration contributes 20.8% to student learning outcomes.

DISCUSSION

The results above, which consist of a healthy diet, study concentration, and average learning outcomes are obtained. Based on the analysis of the data obtained, it can be said that there is a real influence between concentration on student learning outcomes with the help of interactive learning videos was 20.8%. An analysis of the influence of the correlation coefficient is positive, meaning that the influence is positive, that is, the higher the student's concentration, the more influence it will have on learning outcomes. The calculated F value is 8.416 with a significance of 0.007 ≤ 0.005, indicating that there is an influence between learning concentration and learning outcomes assisted by interactive learning videos. based on Project Based Learning. Meanwhile, the calculated F value is 0.377 with a significance of 0.543 ≤ 0.005, indicating that there is no real influence between a healthy diet and learning outcomes assisted by interactive learning videos based on Project Based Learning. Through a linear regression test, the correlation value between concentration and learning outcomes is 0.456. So, from this research, it can be concluded that a healthy diet does not influence concentration, while concentration has an influence on learning outcomes for 20.8% of class XI-I SMA Tamansiswa Binjai.

A healthy diet is 64 in the sufficient category. In order to improve students' healthy diets, various efforts need to be made by the school, parents, and the surrounding environment. Actions that can be used are providing healthy food choices in the school canteen. The canteen should offer a quality menu for the body, such as vegetables, fruit, vegetable protein, and good sources of carbohydrates. Based on research conducted by (Mukra, 2023). The negative impact of unhealthy eating patterns is physical and cognitive impairment as well as children's memory. Another bad impact that can be caused is that the child's brain development will be disrupted, which will result in a decrease in the child's learning ability (Azizah & Rizana, 2023).

Study concentration was obtained on average 68 in the good category, which shows that a healthy diet can help students maintain concentration and energy levels, so they can study effectively throughout the day. A healthy diet can also help brain development, physical growth, intelligence, and social maturity. Concentration in teaching and learning activities is an important factor in education because with good concentration it will be easier for students to understand

learning material, retain the information provided, and enable students to complete both assignments and face the exams they will pass. Students with a low level of concentration will generally have low learning outcomes because they have difficulty understanding the learning material, besides that low concentration can affect problem-solving abilities and difficulty in making the right decisions (Elis & Khairuna, 2024).

Student learning outcomes obtained an average of 84 with a very good category which shows that healthy eating patterns, and learning concentration assisted by project-based interactive learning videos show an increase in learning outcomes with an average of 84. The advantage of using PjBL-based animated videos is the level of teacher effectiveness in delivering higher level material, project work is guided and assisted by video, the level of damage is low so it can be used repeatedly, the teacher's ability to operate technology is needed, improve skills, and add new experiences for students (Adiyanti, 2020).

There is a significant influence between learning concentration and student learning outcomes on the human digestive system material. A positive correlation coefficient indicates that the influence is positive, meaning that the higher the student's learning concentration, the better their learning results. Learning concentration has a positive relationship with student learning outcomes, so it can be concluded that the higher the level of student concentration in learning, the better the results achieved. Having full concentration allows students to be able to remember the learning material taught and master the expected competencies.

CONCLUSION

It can be concluded that there is a real influence between concentration on student learning outcomes with the help of interactive learning videos was 20.8%. The analysis obtained that the influence of the correlation coefficient is positive means that the influence is positive, that is, the higher the student's concentration, the more influence it will have on learning outcomes. Meanwhile, testing a healthy diet with learning outcomes has not shown a significant effect. This research implies that teachers, as facilitators, should use appropriate learning models and media, especially in biology learning. Student learning concentration can be formed through the use of the Project Based Learning model which is supported by interactive learning videos, which in turn can improve student learning outcomes. Teachers need to design learning videos that are not only informative but also interesting and interactive to maximize student participation. This requires training and creativity in creating or selecting videos that suit student needs and the curriculum.

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