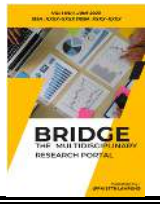
BRIDGE: The Multidisciplinary Research Portal
Vol. 1, No. 1 (2023), pp. 31-39 | p-ISSN: xxxx-xxxx, e-ISSN: xxxx-xxxx
https://jurnal.sttnlampung.ac.id/index.php/bridge



Understanding of Vector Materials with PAILKEM (Active, Innovative, Environmental, Creative, Effective, and Interesting Learning)

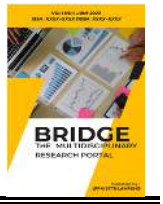
***Radha Krisnamurti Sigamura[1]**
[1] Civil Engineering, Musi Rawas University, South Sumatera, Indonesia
E-mail: [1]radhakrisna964@gmail.com *Corresponding Author

Article History: Received: July, 4th 2023; Accepted: August, 11th 2023; Published: August, 14th 2023

ABSTRACT

There are many mathematics learning strategies used by educators to achieve more optimal results. The PAILKEM learning strategy is one of the learning strategies that makes it possible to achieve learning objectives. The purpose of this study is to improve comprehension results. The hypothesis in this study is that there is a significant influence of the PAILKEM learning strategy (Active, Innovative, Environmental, Creative, effective, and Interesting Learning) on understanding vector material. This research method uses an experimental method using a True Experimental Design. Data analysis was performed using the t-test. The results of the study, after testing the hypothesis using the t-test with a significant level of 0.05 and previously carrying out the normality test and homogeneity test, obtained $t_{count} > t_{table}$, namely $t_{Count} = 7.636 > t_{table} = 1.6689$, so that Ho was rejected and Ha was accepted. The conclusion in this study is that there is an influence of the PAILKEM learning strategy (Active, Innovative, Environmental, Creative, effective, and Interesting Learning) on the understanding of vector material.

Keywords: *PAILKEM, Learning Staregy, Vector.*



INTRODUCTION

Education is an important means to improve the quality of Human Resources (HR) in ensuring the sustainable development of a nation. Improving the quality of human resources is far more urgent to be realized, especially in facing the era of global competition. Therefore, improving the quality of human resources from an early age is a very important thing that must be seriously considered. If education is one of the main instruments for human resource development, educators, in this case teachers, as one of the elements that play an important role in it, have the responsibility to develop tasks and overcome any problems that arise.

The successful implementation of a learning strategy in study groups depends on the expertise of educators in using the techniques, methods, and learning strategies. But unfortunately, it is found that the implementation of learning is still not varied, the learning process has a tendency towards certain (conventional) methods, and it tends not to pay attention to the level of understanding of the material presented.

So, in short, the problems faced in the world of education, one of which is the weakness of the learning process, In the learning process, students are less encouraged to develop thinking skills. The learning process in the classroom is directed at individual abilities to memorize information. Students are used to remembering and hoarding information without trying to relate what is remembered to everyday life. The result can be seen as being smart theoretically but poor in application (Susanto, 2014:vi). Currently, the world of education is entering an era marked by incessant technological innovation. We can see the development of science and technology (IPTEK) that is changing rapidly. This situation has spurred the world of education to be more sensitive to changes that occur so as not to miss information that covers the scope of education, especially schools as a place to study. The use of technology requires a special expertise or skill to produce superior Human Resources (HR) and competence.

Education is an important tool to improve the quality of human resources (HR) and ensure the sustainable development of a nation. Improving the quality of human resources is far more urgent than ever, especially in the current era of global competition. Therefore, improving the quality of human resources from an early age is a very important thing that must be seriously considered. If education is one of the main instruments for developing human resources, educators, in this case, as one of the elements that play an important role in it, have the responsibility to develop tasks and

overcome any problems that arise. In his role as class manager (learning manager). Educators should be able to handle the class because it is an environment that needs to be organized. To overcome problems in learning, various strategies are needed. One of them is the use of appropriate learning strategies in the learning process, so students will feel happy about the learning process itself. The chosen learning strategy is expected to be able to improve student learning outcomes. The learning strategy chosen by the author is the PAILKEM learning strategy.

The PAILKEM strategy is a strategy that can be applied to learning activities. It is meant by strategy because the field of work focuses on how to: (1) organize learning material; (2) convey or use learning methods; and (3) manage learning as desired by learning scientists so far, such as Reigeluth and Merill, who have laid the foundation—an instructional basis that optimizes the learning process (Hamzah, 2013:10).

PAILKEM Learning Strategy

The PAILKEM learning strategy is one of the strategies that can be applied to learning activities. It is meant by strategy because the field of work focuses on how to: (a) organize learning materials; (b) deliver or use learning methods; and (c) manage learning.Jauha (2011: 150) and Ismarina Rosida (2014) describe the PAILKEM strategy as a teaching approach that is used with certain methods and various teaching media accompanied by the arrangement of the environment in such a way that the learning process becomes active, innovative, creative, effective, and fun.PAILKEM stands for active, innovative, environmental, creative, effective, and interesting learning.

PAILKEM is a good strategy if used in the teaching and learning process because the teaching and learning process occurs in multiple directions so that the desired learning outcomes will be achieved.The research method is the method used by researchers to collect research data (Arikunto, 2010:203). In connection with the problem being researched by the author, this study uses an experimental method of the true experimental design type.

According to Sugiyono (2014: 112), the main characteristic of the true experimental design-type method is that the samples used for the experimental group and the control group are taken randomly from a certain population. Then the true experimental design form taken in this study is the posttest-only control design.

In this design, there are two groups, each of which is randomly selected (E); the first group is given treatment and the other group is not; the group that gets treatment is

called the experimental group, while the group that does not get treatment is called the control group. The effect of the treatment is (O_1:O_2). O_1 is the result of understanding vector material using the PAILKEM learning strategy in the experimental class, and O_2 is the result of learning without using the PAILKEM learning strategy in the control class.

METHODS

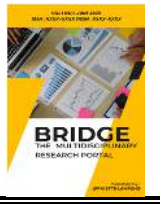
This study examines the influence of the PAILKEM learning strategy (active, innovative, environmental, creative, effective, and interesting learning) on the understanding of vector material. The research began on March 9, 2023, and ended on March 23, 2023. The implementation of this research was carried out in three stages: planning, implementing, and reporting.

At the planning stage, the researchers compiled learning tools and instruments. From the observations, it was determined that the study population consisted of two classes, namely class A and class B, where the two study groups were given the same march with different treatment.The method used in this study is the true experimental design method, which is the posttest-only control design. This method was applied to the experimental class, which received treatment, while the control class did not receive treatment.

The final test was given at meeting 3, but before doing so, the two classes were given different treatments: for the experimental class, namely class A, using the PAILKEM learning strategy (Active, Innovative, Environmental, Creative, Effective, and Interesting Learning), and for class B, using the conventional learning method. The final test used in this study was a written test in the form of essay questions. There are 5 questions with square and rectangular subject matter that refer to 6 cognitive domain indicators, namely knowledge (C1), archery (2), application (3), analysis (4), synthesis (5), and evaluation (6).

RESULTS AND DISCUSSION

To find out whether or not there is an influence of the PAILKEM learning strategy on learning outcomes, data is first collected. Both data from the experimental class in class A using the PAILKEM learning strategy and data from the control class using conventional learning methods in class B are analyzed using the t-test.



Before using the t test, the data must be normally distributed, because the t test can only be used if the data is normally distributed. In addition to normally distributed data, a sample homogeneity test must also be carried out to find out whether the sample used is homogeneous or not.

Table 1. Comparison of Learning Outcomes Based on Indicators in The Cognitive Spread of Experiment Class and Control Class

Learning Outcomes Based on the Cognitive Realm	Experiment Class	Control Class
Understanding (C1)	94.77	84.62
Understanding (C2)	90.83	90.23
Applying (C3)	90.92	77.40
Analysis (C4)	86.38	55.69
Synthesis (C5)	78.38	53.88
Evaluation (6)	59.66	28.88
Average	79.5	57.2

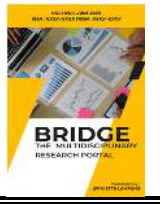
The table above shows that the learning outcomes in class A as an experiment are better than in class B as a control. This can be seen from the average score achieved in the experimental class with a value of 79.5, which is higher than the average value in the control class with a value of 57.2.

From the results of the normality test, it was obtained that the significant value for the experimental class was 0.20 > 0.05 based on the criteria, and H_0 was accepted, so the experimental class's learning outcomes were normally distributed. Then the significant value in the control class is 0.20 > 0.05 based on the criteria, and H0 is accepted, so the learning outcomes of the control class are also normally distributed.

The homogeneity test results obtained a significant value of 0.959 > 0.05, so it can be concluded that the variances of the two classes are homogeneous; in other words, there is no significant difference in variance between the experimental class and the control class.

Hypothesis testing

From the results of the hypothesis test, it is obtained from the above calculation that if $t_{count} > t_{table}$, namely the value of $t_{count} = 7.637 > t_{table} = 1.668829$, then H_0 is rejected and Ha is accepted. It is concluded that there is an influence of the PAILKEM learning



strategy (active, innovative, environmental, creative, effective, and interesting learning) on the understanding of vector material.

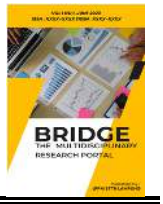
After the research was carried out from March 9, 2023, to May 28, 2015, with the first meeting held on March 23, 2023, From the results of the research conducted by the researcher through tests conducted at the end of the fourth meeting or meeting on May 28, 2015, test data was obtained as a final (posttest) to determine understanding of vector material.

Based on the analysis of learning outcomes, the difference in test results obtained by students using the PAILKEM learning strategy is greater than the test results obtained by students using conventional learning methods. This difference is clearly seen from the average score obtained in the experimental class, which is 79.50 with the stage of achieving indicators in the cognitive domain at the stages of knowledge (C1), understanding (C2), application (3), analysis (4), and synthesis (5), and the standard deviation is 2.1, while in the control class the average value is 57.20 with the stage of achieving indicators in the cognitive domain only at the stages of knowledge (C1), understanding (C2), application (3), and a standard deviation of 2.0. To prove the analysis of learning outcomes in the experimental and control classes, statistical tests were carried out using the t test.

Before carrying out the t test, the normality test and homogeneity test were carried out. Based on the results of the data normality test, a significant value was obtained for the experimental class, which was 0.20 > 0.05 based on the criteria. H_0 was accepted, so the experimental class's learning outcomes were normally distributed. Then the control class normality test was carried out, and a significant value of 0.20 > 0.05 was obtained based on the criteria. H_0 was accepted, and the control class learning outcomes were also normally distributed. Thus, it can be concluded that the two classes, namely the experimental class and the control class, are normally distributed.

Then a homogeneity test was carried out to find out whether the sample used was homogeneous or not. The homogeneity test is used to test the variance of the two samples. From calculations using SPSS, a significant value of 0.959 > 0.05 is obtained, so it can be concluded that the variances of the two classes are homogeneous.

After the data meets the normality and homogeneity tests, a hypothesis test is carried out to find out whether or not there is an influence of the PAILKEM learning strategy (Active, Innovative, Environmental, Creative, Effective, and Interesting



Learning) on understanding class A vector material. From the test results for the sample group, t_{count} = 7.367 with a significant level of 5% (0.05) with dk 70 obtained t_{table} = 1.669. In accordance with the testing criteria, H_0 is rejected and Ha is accepted if $t_{count} > t_{table}$, because 7.637 > 1.668829, which means Ha states that "There is an influence of the PAILKEM learning strategy (Active, Innovative, Environmental, Creative, Effective, and Interesting Learning) on understanding class A vector material acceptable.

Treatment with the PAILKEM learning strategy makes students more active in expressing opinions, asking and answering questions given in the learning process, and better understanding the material being taught. In this active learning strategy, it is hoped that all their potential will grow and develop so that, in the end, they can optimize their learning outcomes (Hamzah, 2013: 10). PAILKEM also assists students in preparing their intellectuals, from simple to higher. While the treatment uses conventional methods, students are only given explanations or lectures from the teacher without any practice. So that students understand but do not understand the material presented by researchers. As a result, the value of student learning outcomes is less satisfying.

However, there are still a number of students in class A (the experimental class) whose learning outcomes are unsatisfactory. This is because students are not used to the PAILKEM learning strategy as a habit in their learning process. The application of the PAILKEM learning strategy will be effective if educators also play an active, proactive, and creative role in finding and designing alternative teaching media that are easy, cheap, and simple but still have relevance to the subject themes students are studying. Overall understanding is included in the pretty good category. This can be seen from the results of the final tests collected and assessed.

Based on the description above, it can be seen that there is an influence of the PAILKEM learning strategy on understanding vector material. The reason is the test results, which show good grades and look very active. In this active learning strategy, it is hoped that all their potential will grow and develop so that, in the end, they can optimize their learning outcomes (Hamzah, 2013: 10). So that in the PAILKEM learning process, it can be applied.

CONCLUSION

Based on the results of research conducted at the Faculty of Engineering, it can be concluded as follows: "There is a significant influence of the PAILKEM learning

strategy (Active, Innovative, Environmental, Creative, Effective, and Interesting Learning) on understanding vector material.

This is seen from the results achieved by students in the experimental class or classes using the PAILKEM learning strategy to get better grades compared to the control class or classes using conventional (ordinary) learning models. This difference can be seen clearly in the mean value of the final test where the experimental class is 79.5 and the value obtained in the control class is 57.2. The results of the study after testing the hypothesis using the t test with the criteria for testing H0 were rejected and Ha was accepted if $t_{count} > t_{table}$ with a significant level of 0.05 obtained $t_{count} = 7.637$ and $t_{table} = 1.669$, it can be concluded that t_{count} 7.637 > t_{table} 1.6689 so H_a is accepted.

BIBLIOGRAPHY

Arikunto, Suharsimi. 2010. *Prosedur Penelitian Suatu Pendekatan Praktek.* Jakarta: Rinaka Cipta.

Aqid, Zainal. 2013. *Model-Model, Media, dan Strategi Pembelajaran Konstekstual (Inovatif)*. Bandung: Yrama Widya.

Rosida,ismarina.dkk. *Peningkatan aktivitas dan hasil belajar matematika siswa kelas VB memalaui pendekatan PAILKEM di SNN 29 Ganting Utara Kota Padang*.online. terdapatpada.*http://*ejournal.bunghatta.ac.id/index.php?journal:JFKIP&page=article&op=view&path[]=3441.path[]:2955. diakses 22 Maret 2015.

Sugiyono. 2014. *Metode Penelitian Pendidikan Pendekatan Kuantitatif., Kualitatif dan R & D.* Bandung: Alfabeta.

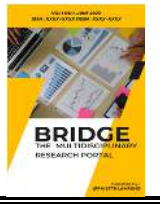
Uno, Hamzah B. 2013. *Belajar dengan Pendekatan PAILKEM.* Jakarta: Bumi Aksar

Soewito, R. (2017). METODE PAILKEM (Pembelajaran Aktif, Inovatif, Lingkungan, Kreatif, Efektif, dan Menyenangkan. *JURNAL PENGGERAK*, *3*(1).

Argarini, D. F. (2018). Analisis pemecahan masalah berbasis Polya pada materi perkalian vektor ditinjau dari gaya belajar. *Matematika Dan Pembelajaran*, *6*(1), 91-100.

Kurniawan, B. R., Saputri, D. E., & Shoiqin, M. I. (2019). Analisis pemahaman konsep mahasiswa pada topik vektor. *Efektor*, *6*(2), 107-114.

Prawendra, Y., Sartianis, G., & Kusairi, S. (2022). Komparasi Penguasaan Konsep Siswa SMA dan Mahasiswa Pendidikan Fisika Pada Materi Vektor. *Jurnal Pendidikan Fisika*, *10*(1), 49-61.



Pitono, A. P. C., Damayanti, B. P., & Setiaji, B. (2023). ARTIMAS (Augmented Reality Timun Mas) Solusi Meningkatkan Pemahaman Relasional Siswa pada Materi Vektor: Uji Kelayakan. *COMPTON: Jurnal Ilmiah Pendidikan Fisika*, *9*(2), 145-152.

Zega, L. J. P., Dachi, Y. A., Siboro, A., & Tampubolon, R. (2022). PENGARUH MODEL BLENDED LEARNING TERHADAP PEMAHAMAN KONSEP FISIKA PADA MATERI VEKTOR DI KELAS X SEMESTER I SMA SWASTA KEMALA BHAYANGKARI. *JURNAL PENELITIAN FISIKAWAN*, *5*(2), 27-38.

Olga, L. (2023). ANALISIS PERAMALAN PERMINTAAN PRODUK KERTAS MENGGUNAKAN METODE PERAMALAN LINIER DAN METODE EKSPONENSIAL DI PT. INDAH KIAT SERANG. *Journal of Management and Industrial Engineering (JMIE)*, *2*(1), 17–30. Retrieved from https://jurnal.sttnlampung.ac.id/index.php/jmie/article/view/8

Purnami, A. S. Upaya Meningkatkan Pemahaman Konsep Matematika Melalui Hypothetical Learning Trajectory Pada Materi Vektor.

Rohmah, R. N. (2019). *EFEKTIVITAS PELAKSANAAN APERSEPSI WARMER UNTUK MEMBANGUN PEMAHAMAN KONSEP PADA PEMBELAJARAN MATERI VEKTOR* (Doctoral dissertation, University of Muhammadiyah Malang).

Muhammad, N. (2017). *Penerapan Model Anchored Instruction (AI) untuk Meningkatkan Pemahaman Konsep Peserta Didik pada Materi Vektor* (Doctoral dissertation, UIN Sunan Gunung Djati Bandung).

Dwiguna, K., Rahman, T., & Olga, L. (2022). ANALISIS DISTRIBUSI MENGGUNAKAN PENDEKATAN SISTEM DINAMIS (Studi Kasus PT. Chairo Abadi Sentosa Bandar Lampung). *Journal of Management and Industrial Engineering (JMIE)*, *1*(1), 35–46. Retrieved from https://jurnal.sttnlampung.ac.id/index.php/jmie/article/view/4

Supardi, S., Poerwono, P., Kaban, H., & Cahyati, N. (2021). Identifikasi Pemahaman Mahasiswa Terhadap Besaran Vektor Dan Besaran Skalar Pada Konsep Momentum Dan Energi. *Jurnal Inovasi dan Pembelajaran Fisika*, *8*(2), 127-135.

Harahap, Y. N., Diva, D. F., Andriyani, J., Prasiska, M., Tobing, T. E. W. L., Rangkuti, S. A., & Irani, A. R. (2023). Studi Literatur Pengembangan Media Interaktif pada Materi Vektor. *Journal on Education*, *6*(1), 6277-6283.

Karimah, N. I., & Wahyuni, I. (2018). DESAIN BAHAN AJAR BERBASIS KEMAMPUAN PEMAHAMAN MATEMATIS PADA MATA KULIAH KALKULUS VEKTOR. *Pedagogy: Jurnal Pendidikan Matematika*, *3*(1).