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BLENDED LEARNING MODEL USING KAHOOT APPLICATION ON STUDENTS' LEARNING OUTCOMES

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ABSTRACT

One of the main challenges in science education today is the low level of student engagement and understanding, particularly in abstract topics such as global warming. Teachers often struggle to find innovative methods to enhance student interest and improve learning outcomes. This research aims to determine the effect of abstracting the Kahoot-assisted blended learning model on student learning outcomes in class X global warming material at SMK Qurrota A'yun NWDI Joben for the 2024/2025 academic year. This type of research uses a quantitative approach, pre-experimental research methods with a one-group pretest-posttest design. The population in this study was one class, namely class x, with a total of 26 students. The sample in this study was all students in one class. One class was given a pretest as a control values class, then given treatment, and then given posttest as experimental values class. Data diambil menggunakan teknik pretest dan posttes. Kemudian data dianalisis menggunakan statistik parametrik dengan uji t-test berpasangan. The results of data analysis show that the average score of student learning outcomes on the pretest is 54.23, and the average score of learning outcomes on the posttest value is 86.04. The data analysis technique uses the t test with the results of data analysis obtaining a t count of 16.61 and a t table value of 2.01 with a significance level of 5% and dk = 50. These results show that tcount > ttable (16.61 > 2.01) which means that Ho is rejected and Ha is accepted. It can be said that there is an influence of the Kahoot-assisted blended learning model on student learning outcomes for class x global warming material at SMK Qurrota A'yun NWDI Joben.

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INTRODUCTION

Education is a conscious effort to prepare students to face their future roles through guidance, teaching and/or educational activities according to Law No. 2 of 1989, Chapter 1, Article 1 (Hamalik, 2014). "The purpose of education is a set of educational outcomes achieved by students after learning activities". 24th century education requires students and teachers to form learning that can improve 4c, namely collaboration, communication, critical thinking and creativity. The demands of 24th century learning are the responsibility of all subjects. One of them is Physics which is one of the subjects taught in higher education such as MA, SMA, SMK levels.

Physics is part of Natural Sciences (IPA) which is one of the basic sciences *that* is the foundation in an individual's mindset to be developed into the main supporter in solving problems, especially with the application of practical science (Darmaji & Kurniawan, 2021). Therefore, in learning physics, students are required to focus, be active, often practice questions, discuss and ask questions (Amri, 2022). Integrated science learning by combining various concepts helps students understand the relationship between concepts and their applications (Palayaswati, 2015). In line with the implementation of Education in Vocational High Schools related to applied sciences with demands for participant competency, Physics study teachers are required to play an active, competent and professional role in serving students in the learning process (Ramadhan et al., 2020). Because physics as a basic science *will* form analytical, logical, and systematic mindsets in students. The learning process in schools which often experiences many obstacles, opposition and demands more specifically in Vocational High Schools, is expected to be able to produce graduates who have standard basic competencies and are skilled and independent (Nuri & Rusilowati, 2018). For this reason, the learning system in vocational schools requires strategies, methods and targets that must be continuously developed by physics teachers.

From the problems above, a solution is needed. By compensating for the weaknesses of the method and improving learning outcomes. The *blended learning model* is the right way to carry out the learning process. The *blended learning model* is a learning model that combines traditional learning and utilizes *e-learning.* This combined learning model certainly has advantages, especially in being able to manage the use of time and space more effectively. With this *blended learning approach,* teachers and students can also work together, adapting gradually to the ongoing advancement of educational technology. The implementation of the blended learning model provides flexibility in the learning process and encourages active involvement of students through the integration of online and offline learning (Anggraeni & Nuraeni, 2022). With the support of the *blended learning method,* teachers and students no longer always have to meet face to face in class at the same time. By implementing *blended learning,* educators can use PPT (*Power Point*) other learning applications when delivering lessons so that they become more interesting. Not only PPT, educators can also use learning videos, videos on YouTube when delivering material. Various methods can be used in implementing the blended learning model.

This study aims to examine the effectiveness of the blended learning model assisted by the Kahoot application in improving student learning outcomes, especially in global warming material. The blended learning model is an innovative learning approach that combines face-to-face learning with online learning, allowing students to learn flexibly anytime and anywhere according to their respective learning styles. This flexibility provides space for students to be more active, independent, and involved in the learning process. The support of interactive media such as Kahoot, which is a web-based quiz and game platform, can also increase student motivation and attention because of its attractive appearance and fun quiz format. Through its interactive features, Kahoot can act as an effective evaluation media in learning activities. Based on the results of observations and observations conducted at SMK Qurrota A'yun NWDI Joben, it was found that physics learning in class X is still dominated by conventional methods, where teachers are more active in speaking and students tend to be passive, only listening without being actively involved.

The conditions that have been found have an impact on students' low understanding of the physics concepts presented, and have caused a decrease in their enthusiasm and seriousness in participating in learning. Some students even still show playful behavior during the learning process, which indicates that the method used is less effective and has not been able to achieve the expected learning objectives. Seeing these problems and the availability of supporting facilities at school such as internet networks and LCD projectors, the application of the blended learning model assisted by the Kahoot application is considered relevant and potential to be applied as a solution. Therefore, the researcher conducted a study entitled "The Effect of the Blended Learning Model Assisted by the Kahoot Application on Student Learning Outcomes" to determine the extent to which this model can improve the quality of learning and student learning outcomes.

METHODS

This study uses a quantitative approach that focuses on data in the form of numbers and statistical analysis. This approach was chosen to determine the effect of treatment on student learning outcomes objectively and measurably. Quantitative is used because it allows researchers to measure variables systematically (Afif et al., 2023). This approach is suitable for testing hypotheses and seeing causal relationships between variables (Putri et al., 2023). This approach in education is important to produce valid and reliable research, especially in the context of evaluating learning processes and outcomes (Arifin, 2020). In this context, a quantitative approach is used to analyze the effect of blended learning assisted by Kahoot on learning outcomes. The data obtained will be processed statistically to draw valid conclusions.

The design used in this study is pre-experimental with the type of One-Group Pretest-Posttest Design. In this design, one group of students is given a test before and after treatment to see the changes that occur. The group used was class X Culinary Arts of SMK Qurrota A'yun NWDI Joben, totaling 26 students. All students in the class were used as research samples without dividing the control and experimental groups. The treatment given was in the form of blended learning assisted by the Kahoot application. The pretest results were used as the initial value (control), while the posttest was used as the value after treatment (experiment).

The data collection technique used in this study was a test. The test was conducted twice, namely a pretest before treatment and a posttest after treatment was given. This test is used to measure student learning outcomes on global warming material. Validity, reliability, level of difficulty, and discrimination are important indicators in compiling quality questions (Susanto et al., 2015). It is important to pay attention to the preparation of standardized test instruments so that the evaluation results can describe students' abilities objectively and systematically (Rohayati, 2012). Both the pretest and posttest are arranged based on relevant learning indicators. The posttest was carried out after students received learning using the blended learning model with the kahoot application. The test result data is the basis for evaluating the effectiveness of the learning model used.

The data analysis techniques used in this study are descriptive and inferential statistical analysis. Descriptive analysis is used to determine the average value, maximum value, minimum value, and standard deviation of the pretest and posttest results. Meanwhile, inferential analysis is carried out to determine the significance of the differences in pretest and posttest results. The test

used in inferential analysis is the t-test (paired sample t-test). This test is carried out to test the hypothesis whether there is a significant difference between the results before and after treatment. The data is processed using statistical software so that the results are more accurate. The results of this analysis are the basis for drawing conclusions in the study.

RESULTS AND DISCUSSION

After conducting research conducted at SMK Qurrota A'yun NWDI. The value of student learning outcomes was obtained from the test, namely *pretest* and *posttest,* before and after being given treatment. The following are the pretest and posttest data from the influence of the *blended learning model* assisted by *kahoot* on student learning outcomes on global warming material in class X of SMK Qurrota A'yun NWDI.

a. Data Description

Table 1. Description of Student Learning Outcome Data

Mark	Posttest	Pretest
Highest	96	72
Lowest	75	43
Average	86,04	54,23
Standar Deviasi	5,99	7,71

Based on table 1, it shows that *the posttest* has better learning outcomes compared to *the pretest.* The highest and lowest scores on *the posttest* were 96 and 75, respectively, higher than *the pretest* which only reached 72 and 43. The average *posttest score* of 85.04 far exceeded the *pretest score* of only 54.23, indicating better overall performance on *the posttest score.* In addition, the standard deviation on *the posttest* was 5.99, lower than *the pretest* of 7.71, indicating that the variation in scores on *the posttest* was smaller and the learning outcomes of students in this class were more consistent. The significant increase in learning outcomes from the pretest to the posttest indicates the effectiveness of the learning intervention implemented. The average difference of 30.81 points reflects a better understanding of the concept after the learning process. In addition, the increase in the minimum score from 43 to 75 indicates that even students with the lowest achievements experienced significant development. The maximum value that increased from 72 to 96 also confirmed that high-performing students were able to optimize their potential. The consistency of learning outcomes indicated by the decrease in standard deviations strengthens the indication that learning is not only effective but also equitable (Damayanti et al., 2024). Providing appropriate learning treatment can significantly increase the average learning outcomes of students (Andriani & Suratman, 2021).

Table 2 Frequency Distribution and *Pretest Score Results*

No	Interval class	Frequency
1.	43-47	8
2.	48-52	2
3.	53-57	7
4.	58-62	5
5.	63-67	3

6.	68-72	1
	Amount	26

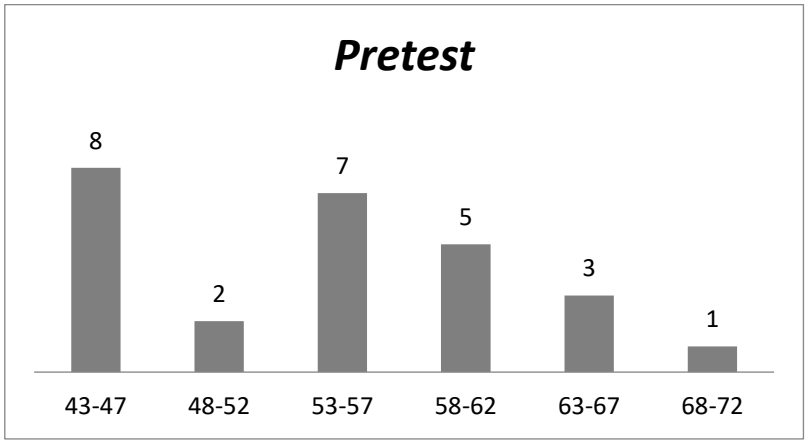

Figure 1. Histogram of Frequency Distribution of *Pretest Scores*

Based on Figure 1 and Table 2 which show the frequency distribution of students' scores on the pretest, it can be seen that most students still have difficulty in understanding the material before being given learning treatment. This is indicated by the concentration of students' scores which are in the low interval. The majority of students, namely 8 people, obtained scores in the interval 43–47, which is the highest frequency in this class. In addition, there were 7 students who obtained scores in the interval 53–57. Only 1 student managed to reach the highest interval, namely 68–72, which reflects that only a small number of students had understood the material well before learning began. Scores in the middle interval, such as 48–52, 58–62, and 63–67, were obtained by only 2, 5, and 3 students, respectively. The low frequency in this interval indicates a gap in understanding among students, as well as unequal initial mastery. The results of this pretest illustrate that the level of students' initial understanding of the material is still relatively low and uneven. This finding is an important basis for planning and implementing further learning strategies to be more focused in improving mastery of the material.

Table 3. Frequency Distribution of *Posttest Scores*

No	Interval class	Frequency
1.	75-78	2
2.	79-82	8
3.	83-86	4
4.	87-90	3
5.	91-94	8
6.	95-98	1
	Amount	26

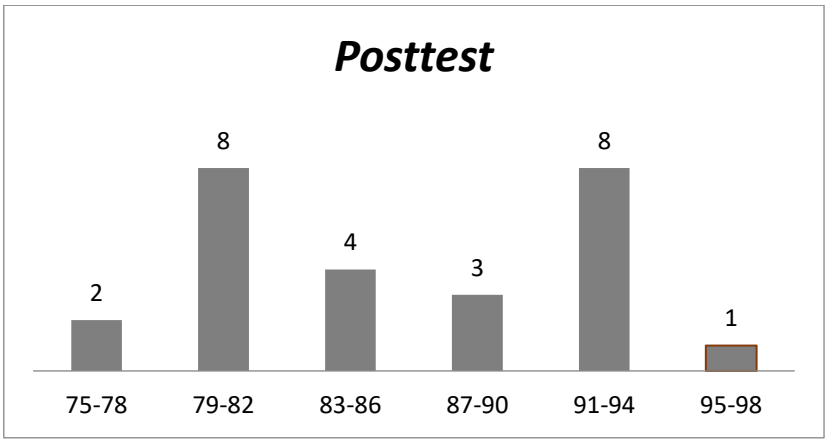

Figure 2. Histogram of Frequency Distribution of *Posttest Scores*

Based on Figure 2 histogram and table 3 frequency distribution above, it can be seen that most students have scores between 79-82 and 91-94 each with a frequency of 8. Furthermore, as many as 4 students have scores in the interval 83-86, and 3 students are in the interval 87-90. Meanwhile, in the interval 95-98, only 1 student achieved it. This value distribution shows the concentration of learning outcomes in two main groups, which reflects differences in achievement among students. Groups with scores 79-82 and 91-94 dominate, indicating that most students are at a fairly good to very good level of understanding. The range of values in the middle, namely 83-90, is relatively less, indicating that not many students are in the transition zone between the two groups. Meanwhile, the highest score achieved by only one student indicates superior potential that needs to be further encouraged. These data provide an overview of the distribution of student abilities that are quite varied but still show a focus on two main levels of achievement. After the blended learning model assisted by the Kahoot application was implemented, there was a significant increase in student grades. This is indicated by the shift in the distribution of grades towards a higher range compared to before the model was used. The interactive and game-based Kahoot application can increase student learning motivation and strengthen understanding of the material (Bahtiarrohman et al., 2025). The quiz session via Kahoot helps reinforce concepts in a fun way (Sakinah et al., 2025). The use of Kahoot as an evaluation medium is considered interactive and fun in measuring understanding of the material (Firdiansyah & Pamungkas, 2021).

b. Prerequisite Test

Table 4. Data Normality Test

Data	Normality		Qualification
	X^2_{count}	X^2_{table}	
Pretest	3,875	11.07	Normal
Posttest	10,514	11.07	normal

Based on table 4 above, the results of the data normality test obtained a value of of 11,070 while the value of 3,875 in *the pretest* and 10,514 in *the posttest,* which means that the data is normally distributed. Because $x^2_{hitung} > x^2_{tabel}$ it shows that the data is worthy of being used in further statistical analysis. Because the data shows a normal distribution, parametric statistical analysis techniques can be applied to test the research hypothesis. In accordance with this, testing is more accurate and valid in assessing the influence of the variables studied. Thus, the results of

the analysis can be trusted to draw the right conclusions. Furthermore, the evaluation process of this data will provide a clear picture of the effectiveness of the intervention or treatment given.

Table 5. Data Homogeneity Test

Data	SD	Variants			Note
Posttest	5.99	35.88	1.65	1.96	Homogeneous
Pretest	7.71	59.44			

Based on the results of the homogeneity test analysis shown in table 3, it can be said that the data has a homogeneous variance. This is indicated by the $F_{\text{table value}}$ of 1.96 and $_{\text{the calculated F}}$ of 1.65. Because $_{\text{the calculated F}} < F_{\text{table,}}$ namely (1.65 <1.96), the data is stated to have the same or homogeneous variance. Thus, the data meets the homogeneity assumption. The homogeneity assumption is an important requirement in parametric statistical analysis such as the t-test and ANOVA, because it ensures that the differences found between groups are not caused by differences in variance, but by differences in means. The homogeneity test of variance is used to ensure that the variance between the groups being compared is consistent, so that the analysis results can be relied on (Nurhaswinda et al., 2025). In addition, the homogeneity test is an analysis technique to determine whether the variance of two sample groups is homogeneous or not (Hambali, 2019).

Table 4. Hypothesis Testing

No	Mark	Posttest		Pretest
1.	Average	86.04		54.23
2.	Variance	35.88		59.44
3.	Sample	26		26
4.	Dk		50	
5.			16.61	
6.			2.01	

Based on the results of the hypothesis test, the results showed that Ho was rejected because the $t_{\text{count value}} > t_{\text{table,}}$ namely 16.61> 2.01, which means that there is an influence of the *blended learning model* assisted by *Kahoot* on student learning outcomes in global warming material in class X of SMK Qurrota A'yun NWDI joben. The blended learning model provides flexibility in the learning process because it combines online and offline learning. Meanwhile, Kahoot as an interactive quiz-based evaluation media is able to create a fun, competitive learning atmosphere and motivate students to be more active. The use of interactive game-based learning media Kahoot can significantly increase students' learning motivation due to its competitive and interesting nature (Hartanti, 2019).

This finding is in line with the results of previous studies. Research by (Izzati and Kuswanto, 2019) showed that the use of Kahoot in a blended learning model can significantly increase students' motivation and learning independence. Likewise, research by (Ariastuti and Agustina, 2022), which showed that blended learning on global warming material improves student learning outcomes with moderate effectiveness values. (Santoso and Widiyanti, 2022) also

emphasized that the use of Kahoot can create more interesting learning and have a positive impact on student learning outcomes.

Based on the research that has been done, the average pretest value is 54.23 and 86.04 for the average posttest value. Where the average posttest value is much higher than the pretest value. After calculating the t-test results, it shows that the tcount value> ttable is 16.61> 2.01, so the null hypothesis (Ho) is rejected. Thus, it can be concluded that there is an influence from the use of the *blended learning model* assisted by *kahoot* on student learning outcomes in the global warming material of class X SMK Qurrota A'yun NWDI Joben.

The low interest of students in participating in learning is caused by students considering physics as a difficult and boring subject, so a more interesting learning model is needed. This perception also makes them tend to be less enthusiastic in participating in the learning process in class. By utilizing technology, students will be more enthusiastic about participating in learning, especially if accompanied by *games. kahoot* containing questions made by teachers to determine students' understanding of the material presented. Assessment of learning outcomes is a measure of classroom learning because it is one of the proofs of student achievement in participating in learning (Astawa, 2022).

To improve interaction, motivation, and understanding in students, one approach that can be taken is the application of a *blended learning model* assisted by *Kahoot. Blended learning* is a learning facility that combines *online* and *offline learning* in delivery, teaching models, and learning styles, introducing various choices of dialogue media between the facilitator and the person receiving the teaching (Hidayah, 2020). Meanwhile, Kahoot is one of the learning media to improve student learning outcomes. Kahoot media can improve learning outcomes and learning motivation of students (Safitri, et al 2023). Kahoot is a simple game for various learning and training purposes both as an evaluation medium, (Seran, et al. 2024). Learning using blended learning assisted by Kahoot can be an alternative in improving students' understanding of global warming material. This statement is in line with this study, where students can improve learning outcomes when they have a good understanding of the formulation of the problem and the expectations of the desired solution.

It can be seen that after being given treatment *(posttest)* it showed better results compared to before being given treatment *(pretest).* This shows that the *blended learning model* allows students to learn flexibly, both inside and outside the classroom, which helps them to understand the material more deeply. The use of *Kahoot* as an interactive evaluation tool also increases student motivation and engagement in the learning process. *Kahoot* provides a fun, competitive, and game-based learning experience, which encourages students to participate actively and be more enthusiastic in absorbing learning materials. These results are consistent with previous research conducted by Musrohul (Izzati and Heri Kuswanto, 2019), entitled "The Effect of the *Kahoot* Application-Assisted *Blended Learning Model* on Student Motivation and Independence", proving that Kahoot-assisted Blended Learning has a significant effect on student motivation and learning independence in the digital simulation subject of class XI TKJ at SMK Bajang NW Ajan. The results of this study also show that motivation can be classified as good, students' learning independence is good, and some students have high motivation and learning independence.

Based on the discussion above, the researcher concluded that the use of *blended learning* assisted by *kahoot* that was applied was able to improve students' understanding of global warming

material. This shows that the use of technology in education, especially with an approach that combines online and offline learning, as well as *kahoot games* containing questions created by teachers to determine students' understanding of the material presented can have a positive impact on students' academic achievement. Students' creative thinking ability in solving problems is closely related to academic achievement, especially in understanding global issues such as global warming (Yasiro et al., 2021). In addition, learning becomes more interactive and fun, so that students are more motivated to be actively involved in the learning process. High student involvement in answering questions in kahoot also helps teachers in evaluating learning in real-time. Thus, blended learning assisted by kahoot can be an alternative effective learning strategy in improving the quality of education in the digital era.

CONCLUSION

Based on the research results obtained, it can be concluded that there is a significant influence of the application of the *blended learning model assisted by the Kahoot* application on student learning outcomes in *global warming material* in class X of SMK Qurrota A'yun NWDI, seen from the results of the t-test obtained that the $_{\text{calculated t value}} > t_{\text{table,}}$ namely 16.61> 2.01. The use of interactive digital media such as Kahoot in a blended learning scheme can increase student engagement and understanding of the material being studied. This study provides a positive contribution to the development of learning strategies in the digital era by showing the effectiveness of technology integration in the teaching and learning process. The application of blended learning that combines online and offline learning and the use of interactive applications such as Kahoot can be an innovative alternative to increase student motivation and learning outcomes.

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REFERENCES

Afif, Z., Azhari, D. S., Kustati, M., & Sepriyanti, N. (2023). Scientific Research (Quantitative) Along with Paradigms, Approaches, Basic Assumptions, Characteristics, Data Analysis Methods and Output. *INNOVATIVE: Journal Of Social Science Research*, *3*(3), 682-693.

Amri, S. (2022). Efforts To Increase Learning Outcomes Using the Jigsaw Model For Class V Students at SDN No. 66/IX Sengeti. *Edu-Sains: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam*, *11*(1), 30-42.

Andriani, R., & Suratman, A. (2021). Android-based learning media to improve student motivation and learning outcomes. *Jurnal Analisa*, *7*(1), 56-65.

Anggraeni, A. W., & Nuraini, K. (2022). Study of Blended Learning Model in Selected Journals: Its Implementation in Learning. *Aufklarung: Jurnal Kajian Bahasa, Sastra Indonesia, Dan Pembelajarannya, 1*(4), 247-267.

Ariastuti, P. A. W., & Agustina, R. (2022). The effectiveness of the blended learning model on global warming material at SMP Negeri 3 Sawit. *Proceeding SNPBS FKIP UMS*.

Arifin, Z. (2020). Metodologi penelitian pendidikan. *Jurnal Al-Hikmah, 1*(1).

Astawa, I. B. M. (2022). Improving students' spatial thinking skills in geography learning through a contextual demonstration method. *Journal of Education Action Research, 6*(2), 242-251.

Bahtiarrohman, B., Febriani, S. A., Tisnasari, S., & Qodariah, L. (2025). The Influence of Application-Based Learning Media (Kahoot) on the Learning Motivation of Class XII IPA Students of MAN 1 Pandeglang in Chemistry Learning. *Jurnal Dunia Pendidikan*, *5*(5), 1712-1721.

Damayanti, E., Patiung, D., & Jumrah, N. M. (2024). Implementation of Coaching for Early Childhood Education Teachers in Improving Self-Efficacy in Teaching Based on the Independent Curriculum. *NANAEKE: Indonesian Journal of Early Childhood Education*, *7*(2), 158-169.

Darmaji, D., & Kurniawan, D. A. (2021) Report on Mapping Science Process Skills (KPS) and High Order Thinking Skills (HOTS) of High School Students.

Firdiansyah, Y., & Pamungkas, H. P. (2021). Analysis of student perceptions of the use of Kahoot as a learning evaluation medium in the monetary economic theory course. *JEKPEND (Jurnal Ekonomi Dan Pendidikan), 4*(1), 1-7.

Hamalik, O. (2014). *Kurikulum dan Pembelajaran*. Jakarta: Bumi Aksara.

Hambali, S. (2019). Homogeneity Test (Equality of Two Variances). *Jawa Barat: STKIP Pasundan Cimahi*.

Hartanti, D. (2019). *Improving student learning motivation with interactive learning media, hypermedia-based Kahoot games*.

Hidayah, N. (2020). The effectiveness of blended learning in the learning process. *Pencerahan, 14*(1), 10-24.

Izzati, M., & Kuswanto, H. (2019). The influence of the blended learning model assisted by Kahoot on student motivation and independence. *EDUMATIC: Jurnal Pendidikan Informatika*, *3*(2), 68-75.

Nurhaswinda, N., Zulkifli, A., Gusniati, J., Zulefni, M. S., Afendi, R. A., Asni, W., & Fitriani, Y. (2025). Tutorial on normality and homogeneity tests using the SPSS application. *Jurnal Cahaya Nusantara*, *1*(2), 55-68.

Nuri, N., & Rusilowati, A. (2018). Production-based learning as an effort to improve the productivity skills of vocational school students. *Physics Communication*, *2*(1), 46-51.

Palayaswati, I. (2015). *Development of an integrated science module based on guided inquiry to improve the science process skills of junior high school students with the theme of household wastewater.* (Doctoral dissertation, UNS (Universitas Sebelas Maret).

Putri, A. D., Ahman, A., Hilmia, R. S., Almaliyah, S., & Permana, S. (2023). Application of t-test in experimental research. *Jurnal Lebesgue: Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, *4*(3), 1978-1987.

Ramadhan, M. A., Handoyo, S. S., & Alfarisi, M. M. (2020). Development of basic physics e-modules for prospective vocational school teachers majoring in construction and property engineering. *Jurnal Pendidikan Fisika dan Teknologi*, *6*(2), 67-76.

Rohayati, I. (2012). *Preparation of Standardized Formative Test Instruments for Junior High School Physics Study Fields.*

Safitri, E., Setiawan, A., & Darmayanti, R. (2023). Experimentation of Kahoot-Assisted Problem Based Learning Model on Self-Confidence and Learning Achievement. *Jurnal Penelitian Tindakan Kelas, 1*(2), 57-61.

Sakinah, H. L., Ni'mah, A., Sulthoniyah, I., & Arisona, D. (2025). Science-gamification: Forms of gamification and implementation in science learning. *Jurnal Kajian Pendidikan IPA*, *5*(1), 15-22.

Santoso, A., & Widiyanti, W. (2022). Utilization of Kahoot in improving science learning outcomes. *Jurnal Inovasi Pendidikan (JINoP), 8*(1).

Seran, W. A., Manek, S. S., & Asa, I. S. (2024). The Influence of E-Learning Learning Model Assisted by Kahoot Application on High School Students' Learning Outcomes. *Dinamika Pembelajaran: Jurnal Pendidikan dan bahasa, 1*(2), 326338.

Susanto, H., Rinaldi, A., & Novalia, N. (2015). Validity and reliability analysis of difficulty level and discrimination power on final semester exam questions for Mathematics subject for class XII IPS at SMA Negeri 12 Bandar Lampung in the 2014/2015 academic year. *Al-Jabar: Jurnal Pendidikan Matematika, 6*(2), 203-218.

Yasiro, L. R., Wulandari, F. E., & Fahmi, F. (2021). Analysis of students' creative thinking abilities in solving problems on global warming material based on student achievement. *Journal of Banua Science Education, 1*(2), 69-72.