

The Effectiveness of Android-Based *E-Modul Discon (E-Modul Disroid)* on Sound Material on Student Learning Outcomes

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Abstract

This research aims to determine the effectiveness of the Android-based E-Modul Discon (E-Modul DISROID) in sound material on the learning outcomes of class V students at SD Inpres 6 Lolu. This research is a quantitative experimental research conducted on two groups, namely the experimental group and the control group. The research design used in this research is Quasi-Experimental with the form of a Control group Pre-test and Post-test design. The population in this study was the entire class V of SD Inpres 6 Lolu for the 2023/2024 academic year, totaling 54 students. The samples in this study were class Va as the control class and Vb as the experimental class. The instrument used is a test instrument, namely multiple choice questions whose validity and reliability have been tested. Data analysis used required tests, namely the normality test and homogeneity test as well as hypothesis testing using the Paired Sample t-test which was analyzed using SPSS For Windows 25. Based on the research results, it showed a significance value (2-tailed) of $0.000 < \alpha$ value of 0.05. Because of the sig value. (2-tailed) $0.000 < 0.05$ then accepting the H_a hypothesis and rejecting the H_o hypothesis, meaning that the use of the Android-based E-Module Discon (E-Module DISROID) in sound material is effectively used for student learning outcomes. Based on the results of hypothesis testing, it can be concluded that the use of the Android-based E-Modul Discon (E-Modul DISROID) in sound material is effective for the learning outcomes of class V students at SD Inpres 6 Lolu.

Keywords: Effectiveness; Discount E-Module; Android; Sound Material; Student Learning Outcomes

1. INTRODUCTION

The Father of Indonesian National Education, Ki Hajar Dewantara, defined the meaning of education; "Education is a requirement in the life of children's growth. What this means is that education guides all the natural strengths that exist in children, so that they as humans and as members of society can achieve the highest safety and happiness." Education not only forms a person who is different from other people who can carry out eating and drinking activities, dress, and have a house to live in, this is what is called humanizing humans (Marisyah & Firman, 2022). Based on the opinion above, it can be concluded that education is a very important factor for the progress of the nation and also for building a good future for a country.

The development of science and technology is now increasingly showing rapid progress. Until now, humans have arrived at the era of society 5.0, which is characterized by the increasingly central role of technology in human life. The era of Society 5.0 seeks to break through the challenges of the previous era, namely the era of Industrial Revolution 4.0 (Umro, 2021). Advances in digital technology provide open opportunities that not only provide convenience but also new challenges for humans living today. The progress that has occurred creates challenges for teachers to adapt to situations that are easy, fast, and digital (Rahma et al., 2021). The quality of civilization possessed by a nation influences the civilization of the nation itself. Now in the 5.0 era which has spread to all corners of the world, one of which is Indonesia which demands activities using technology as an advancement of civilization. Technology nowadays is no longer something that is commonplace but has become a necessity that

must be owned by everyone. Technology is needed in all aspects of life, one of which is education.

Going hand in hand with the teacher's own competence is a right that is of course related to the teacher himself in the sense that it is related to attitudes, actions, as well as skills and abilities in carrying out his duties as teaching staff, so referring to this, the teacher's competence is based on what a person has. teacher is a skill and ability. It is said that skills here (Sulistina & Widodo, 2022) are things related to learning so that in practice learning can run optimally, while the ability of a teacher must of course be able to help discover and develop the interests and talents of his students and also provide motivation. which can increase the enthusiasm of the students themselves. Of course, this is not an easy thing, but if you look at the competence of a teacher, it is an important basis for realizing increasing quality education. (Sutisna & Widodo, 2020).

The role of the teacher is also very central, both as a planner, implementer, and learning evaluator. The quality of learning really depends on the teacher's professional abilities, especially in providing ease of learning to students effectively and efficiently. Teachers have a very big influence on the learning process, one of which is preparing planned teaching media to assist in carrying out learning and increasing learning activities to meet targets for achieving learning outcomes.

Learning media is a factor that can determine the success of the teaching process because learning media is a tool for teachers to convey lesson material to their students. So far, there are a lot of learning media that have emerged, both in print and non-print form, but there are still not many learning media that have been developed into interactive multimedia which is more complex in terms of content and usefulness and most importantly in accordance with the independent curriculum. used now. One of the many learning media available, digital modules (E-Modules) which are equipped with audio-visual technology are expected to be able to attract students' interest so that teaching and learning activities will be created in a conducive manner.

Based on the results of initial observations that researchers carried out at SD Inpres 6 Lolu by interviewing teachers for classes Va and Vb, the data obtained for the number of students for class Va was 27 students, and the number of students for class Vb was 27 students. In science learning at SD Inpres 6 Lolu, in class Va, students got a science score with the highest score of 92 and the lowest score was 88. Meanwhile, in class Vb, students got a science score with the highest score of 100 and the lowest score of 80. Based on the results of the interview with the class V teacher, it was obtained data that learning sciences use printed books on sciences. In the science learning carried out at SD Inpres 6 Lolu, it was discovered that class V students rarely carried out science practicum activities.

Based on the results of the observations above, science and science learning sound material in class V of SD Inpres 6 Lolu still uses printed books so that student learning outcomes are still seen from the value of their knowledge alone. In fact, in the field, hands-on activities such as practicum are still rarely carried out in the current learning era, this is based on the results of interviews with the class V homeroom teacher. In delivering science material related to practicum, the teacher only gives examples using objects around him and provides explanations of the material directly to students. So students become less active in learning activities because students do not carry out learning activities in real situations related to the theory they have previously obtained. In schools, there are also no electronic practicum modules that can be used as teaching media in science learning.

According to Kalembe et al., (2018) integrated science learning is natural science learning by combining several subjects originating from various fields of physical science, biological science, and chemistry into one subject. Science learning in elementary schools aims to instill basic science learning concepts in order to solve problems later. Science learning in elementary schools on sound material consists of understanding sound waves, the speed of sound waves, the properties of sound waves, and the ear as the sense of hearing. Sound material is one of the materials that has practical competence, so the characteristics of this material are practical experimental activities. Practical activities related to sound material in class V are found in basic competency 4.6, namely presenting reports of observations and/or experiments on the properties of sound. Of the various existing learning models, the Discovery Learning model is the model that researchers feel is the most effective for learning science and technology, especially in sound material. This is because the Discovery Learning model in the learning process involves observing and trying to understand a concept.

According to Hosnan, (2016) stated that discovery learning is a model of developing an active way of learning by obtaining and studying it yourself so that the results obtained can be remembered

continuously. By using this learning method, students can also learn to think, analyze, and solve problems. Furthermore, according to (2015) discovery learning is a model for developing active ways of learning for students by discovering and investigating so that the results obtained will be long-lasting in students' memories and will not be easily forgotten. The discovery learning model is the discovery of concepts with a series of data or information obtained through observations or experiments Cahyo (2013). From the various opinions above, it can be concluded that the characteristics of the discovery learning model include: (1) exploring and solving problems to form, combine, and announce knowledge, (2) focusing on students, and (3) activities combining new knowledge and existing knowledge. existed before.

Referring to these problems, an effort is needed to improve learning activities in schools. Practicums need to be held to improve student learning outcomes, based on the results of field studies, an Android-based E-Module Discount (DISROID) is available, which is a development of the discovery learning practicum module in printed form, into an application-based electronic module (E-Module) that can be accessed via Android.

This change from printed modules to E-Modules adapts to the development of education 5.0. Electronic modules (E-Modules) are a form of independent learning material that is arranged systematically, and displayed in electronic, audio, animation, and navigation formats (Seruni et al., 2019). Lithia in Annisa & Sari's (2021) E-Practicum module consists of various videos, sounds, and images that can be accessed electronically. The science practicum e-module with a discovery learning approach is a form of electronic module that is used as a learning medium in science learning practicum activities in elementary schools.

The Discon (Discovery Learning) e-Module combines the use of Android. Teachers and students are required to be able to adapt to developments in technology and communication that exist in the era of the Industrial Revolution 5.0. Discon e-modules are electronic-based books written with the aim that students can learn independently without any guidance from teachers by using teaching materials that can be used to help the learning process, especially in the process of understanding the concepts of material so actively and independently that later get a statement. Dwiningsih in Kimianti & Prasetyo, (2019) The current generation is very sensitive to technology, which gives them the advantage and ability to use technology to advance their knowledge. Student learning outcomes can be improved by using smartphones during the learning process. This enormous potential needs to be fully realized in order to provide more effective and enjoyable learning.

Electronic modules based on Android applications are part of the teaching media created using digital means. Apart from that, the Android application-based E-module encourages students to learn independently and solve existing problems and can also increase students' interest and motivation in learning. The advantage of Android application-based E-modules with printed modules is the interactive, flexible nature of E-modules (can be used for online and offline learning anytime and anywhere). Apart from that, it is easy to navigate, can show or load videos, images, audio, and animations, and is equipped with formative tests that allow immediate automatic feedback (Arshal et al., 2019).

The Discon E-Module is a development of the Discon Practicum Module which is presented in the form of an Android-based application with a cartoon background with background sound that can attract attention and make students not bored and feel comfortable while learning. This research examines how effective the use of the E-Module Discon is on student learning outcomes in science and science subjects, by looking at the comparison of student learning outcomes before and after using the E-Module Discon on sound material in class V SD Inpres 6 Lolu with the use of this E-Module, it is hoped that it can improve and increase student learning outcomes.

2. RESEARCH METHOD

This research was conducted at SD Inpres 6 Lolu, which currently rarely carries out practicums, especially in science and science learning. This research was carried out in semester 2 of the 2023/2024 academic year from 18 September 2023 to 19 April 2024. The number of class V students at SD Inpres 6 Lolu was 56 students, consisting of 2 classes, namely class Va, 27 students, and Vb, 27 students. This research is experimental research. The experimental method can be interpreted as the most complete quantitative research approach, in the sense that it meets all the requirements for testing cause-and-

effect relationships (Sukmadinata, 2017). This research was conducted on two groups, namely the experimental group and the control group. The experimental research design used in this research is quasi-experimental with the form of a control group Pre-test and Post-test design. The data collection technique for this research uses a multiple-choice test instrument which has been tested for validity and reliability. There are two data analysis techniques carried out, namely the analysis prerequisite test stage which is tested for normality and homogeneity, so that it can be continued with the analysis technique, namely the hypothesis testing stage which uses the paired sample t-test assisted by SPSS For Windows 25.

3. RESULTS AND DISCUSSION

This research was conducted at SD Inpres 6 Lolu to test the effectiveness of the Android-based Discount E-Module (DISROID) in sound material on the learning outcomes of class V students at SD Inpres 6 Lolu, class Va students as the control class and class Vb students as the experimental class. Student learning outcomes were obtained using a learning outcomes test instrument, which was distributed with 18 multiple-choice questions. This learning outcomes test is obtained from the Pretest and Posttest results of student learning outcomes. The discussion is written concisely and focuses on the interpretation of the results obtained and is not a repetition of the results section. The discussion does not require re-reading the graph, but the results can be grouped to interpret the results and discussed based on theory and previous research results. What is interesting about the results of this research compared to previous ones or what stands out from the results of this observation? The results of the descriptive analysis that was carried out using the SPSS version 25 application aimed to provide an overview of the data that had been collected from the Experiment class and Control class. The analysis results show various results consisting of the average (Mean) standard deviation value, minimum value, and maximum value.

1. Pretest learning outcomes

The pretest is an initial test to determine students' ability to understand sound material. Before being tested in the experimental and control classes, the questions given to students were tested using validity and reliability tests. The results of the pretest data for the experimental class and control class with calculations using the SPSS version 25 program can be seen in Table 1.

Table 1. Results of pretest data analysis in the experimental and control classes

Statistics	Pretest Data	
	Experimental Class	Control Class
Mean	54.26	54.22
Standard Deviation	14,557	15,567
Minimum Score	22	27
Maximum Score	77	77

2. Posttests learning outcomes

The posttest or final test is a test given after treatment, where the experimental class uses the Discon E-Module and the control class uses the IPAS printed book. The posttest is the final test to determine students' ability to understand sound material and the properties of sound and to find out the results of the learning process that has been carried out. The results of the statistical analysis of post-test data for the experimental class and control class can be seen in Table 2.

Table 2. *Posttest* Data Analysis Results for Experimental and Control Classes

Statistics	<i>Posttest</i> Data	
	Experimental Class	Control Class
Mean	74.48	67.81
Standard Deviation	15,192	12,773
Minimum Score	50	44
Maximum Score	100	88

Based on the results of the analysis above, it is concluded that the use of the Android-based Discon E-module (DISROID) in sound material is effective for the learning outcomes of class V students at SD Inpres 6 Lolu, South Lolu District, South Palu District. The difference in the average *Posttest* scores in the two classes shows that the use of the Android-based Discon E-module (DISROID) has an effect on the science learning outcomes of class V students at SD Inpres 6 Lolu, South Lolu District, South Palu District.

3. Normality test

The test criteria used to measure residual normality in this study are H_a accepted if the significance value (Sig.) obtained is $>$ the specified α level, namely 5% (0.05), and H_0 is rejected if the Sig. $<$ 0.05. For the normality test results, the residual distribution is the Kolmogorov-Smirnov formula with the help of calculations using the SPSS for Windows 25 program. The results of the data normality test in the experimental class and control class can be seen in Table 3 as follows:

Table 3. Pretest Normality Test Results for Experimental and Control Classes

Learning Outcomes	Class	<i>Kolmogorov-Smirnov</i>		
		Statistics	Df	Sig
	Experimental Class	0.160	27	0.073
	Control Class	0.148	27	0.136

4. Homogeneity Test

The basis for decision-making for the homogeneity test is: 1) If the possible sig. $<$ 0.05 then the variance of two or more population groups or data samples is not homogeneous. 2) If the possible sig value. $>$ 0.05, then the variance of two or more population groups or data samples is homogeneous, as for df_2 or number of samples (N-2) and Sig. is a significant value, the significant value in the experimental class and control class is 0.217, which is greater than the set α level, namely 5% (0.05). The results of the homogeneity test above are $0.217 >$ 0.05. This means that H_a is accepted, which means the population comes from homogeneous data. The results of the data homogeneity test in the experimental class and control class can be seen in Table 4 as follows:

Table 4. Hasil Uji Homogenitas Data Kelas Eksperimen dan Kontrol Test Homogeneity if Variance

		Levene Statistic	Df1	df2	Sig.
Learning Outcomes	Based on <i>Mean</i>	1,599	1	52	0,217
	Based on Median	1,599	1	52	0,212
	Based on the Median <i>and with adjusted df</i>	1,599	1	51.951	0,212
	Based on Trimmed Mean	1,532	1	52	0,221

5. Hypothesis testing

In this research, the Paired Sample t-test was used. This hypothesis test was carried out using the Paired Sample t-test. This hypothesis test was carried out using the Paired Sample t Test to see whether or not there was a significant influence from the use of the Android-based Discon E-Module (DISROID) in sound material on the learning outcomes of class V students at SD Inpres 6 Lolu for the 2023/2024 academic year.

Paired Sample t-test analysis is used as a hypothesis testing tool. Paired Sample t-test is a parametric difference test with a normal distribution by testing two paired samples on the same sample with different events. This test is used to test the significant level of influence between the independent and dependent variables. The significance level in this study was 0.05 ($\alpha=5\%$). If the significant value is > 0.05 then the research hypothesis is rejected, stating that there is no significant difference. Conversely, if the significant value is <0.05 then the research hypothesis is accepted, thereby stating that there is a significant difference (Ghozali, 2018).

Based on the output results of the Paired Sample t-test, there is a significance value for the Paired Sample t-test of $0.000 < 0.05$. Because the significant value (2-tired) $< \alpha$ is $0.000 < 0.05$, H_a is accepted and H_o is rejected. Based on these data, it was concluded that the hypothesis test stated that the Android-based Discon E-Module (DISROID) on Sound material was effectively used for the Learning Outcomes of Class V Students at SD Inpres 6 Lolu.

This research was carried out at SD Inpres 6 Lolu using two sample classes, namely class Vb as the experimental class which was given treatment using the Android-based E-Modul Discon, and class Va as the control class with printed IPAS books. Based on the results of the observations above, science and science learning sound material in class V of SD Inpres 6 Lolu still uses printed books so that student learning outcomes are still seen from the value of their knowledge alone. In fact, in the field, hands-on activities such as practicum are still rarely carried out in the current learning era, this is based on the results of interviews with the class V homeroom teacher. In delivering science material related to practicum, the teacher only gives examples using objects around him and provides explanations of the material directly to students, so that students become less active in learning activities because students do not carry out learning activities in real situations related to the theory they have previously obtained. In schools, there are also no electronic practicum modules that can be used as learning media in science learning. After the researchers carried out the learning activity process using the Discon E-Module which can be accessed on Android in the form of a learning application that contains complete material with practical procedures and learning videos as well as formative tests which can be accessed easily by students according to their level of understanding of the material, making the learning process more interactive and fun compared to just reading and observing from a book.

Howe in Azizah & Winarti, P (2016) stated that Discovery Learning is a teaching method that requires more student autonomy or student freedom compared to direct teaching. According to (Azizah, et all: 2020) the Discovery Learning Model is a learning process where students are given learning material, and then given a reference for how this material can be used as an answer to questions or problems given by students. During the learning process, students are required to find the steps, stages, and answers needed until they find them themselves.

The results of the hypothesis testing research stated that the Android-based Discon E-Module (DISROID) on Sound Material was Effectively Used for the Learning Outcomes of Class V Students at SD Inpres 6 Lolu. The effectiveness of the E-Modul Discon can be seen from the Sig t-test value obtained in the t-test analysis results table. In the column you can see that the sign t-test value is smaller than α ($0.000 < 0.05$), so H_o is rejected and H_a is accepted. The influence of the Android-based Discon E-Module (DISROID) on sound material on the learning outcomes of class V students at SD Inpres 6 Lolu was also shown from the post-test activities carried out at the end of the lesson. The average posttest score for the experimental class group was 74.48, while the average posttest score for the control class group was 67.81. The posttest results show that the average score obtained by the experimental class which studied science using the E-Modul Discon was higher than the average score of the control class that studied science using printed books. This means that the use of the Android-based Discount E-Module (DISROID) in sound material has an effect on the science and science learning outcomes for class V SD Inpres 6 Lolu.

This is in accordance with the E-Module in that its use can make it easier for teachers and students.

Electronic media can make the learning process more interesting, and interactive, and can be done anytime and anywhere so that it can improve the quality of learning. So it is necessary to develop a good E-Module to increase student interest and achievement in learning outcomes. Using interactive e-modules can increase students' interest in learning. As in research by Farida and Masyruh (2022) and research by (Martin, et. all: 2021) the use of interactive E-Modules can be used because it is an innovation and uses ICT tools in learning. Interactive E-modules can be achieved by using the Android operating system on a smartphone considering that Android is now a smartphone that is very often used and students can easily learn using Android-based interactive E-Modules (Oktaviani & Arini, 2021). Interactive e-modules can be produced through the use of smartphones based on the Android operating system. E-module is a type of module where there is text, images, graphics, animation, and video that can be accessed anywhere and anytime through simulations that are capable and suitable for learning (Violadini & Mustika, 2021).

Before carrying out the learning process, the researcher gave a pretest to the control class and experimental class which had been determined as samples. The purpose of giving a pretest is to determine students' initial abilities before the learning process is carried out and to obtain an average score from the two classes. After being given a pretest, the researchers carried out a learning process in the control class and experimental class, by providing different treatments but on the same material, namely sound and the properties of sound. The learning process carried out in the experimental class has been carried out in accordance with the activities that must be carried out with the steps in the Discon E-Module and adapted to the teaching module. At the beginning of learning, namely syntax section 1, students are directed to open the application and view the material in the Discon application, after that students view videos related to the material on the InFocus screen. Then students express their opinions regarding the properties of sounds that they already know. Next, students are divided into several groups while the teacher guides students to discuss determining hypotheses for the problems presented. Students then carry out experiments by preparing tools and materials that will be used for testing during the practicum. The teacher directs students to observe the practicum carried out. The practicum is to carry out learning activities in real situations related to the theory they have previously obtained so that what has been learned can be better absorbed and remembered for a long time by the students.

Practical activities carried out cause learning to become more interactive, increase students' interest in learning, make students more active in participating in learning, increase students' enthusiasm for learning, and trigger their curiosity so that student learning outcomes can increase. The advantages of using the Android-based Discount E-Module (DISROID) are: (1) Reduces paper use. The E-Module which is developed based on an Android application can be downloaded on each user's smartphone. (2) The Discon E-Module application is very easy to operate and makes students understand the material being explained better. (3) The E-Modul Discon application can also be said to be flexible because its use is not limited by time or place, so students can access the E-Modul Discon application even if they are not in the classroom or while learning is taking place. (4) The Discon E-Module application is equipped with practicum implementation procedures so that students can easily follow the implementation even though they are outside the school environment. (5) The E-Modul Discon application provides a more complete explanation of the material compared to printed books. Sinta (2022)

The use of the Android-based Discon E-Module (DISROID) also has weaknesses in its operation which are described as follows: (1) The learning videos contained in our Discon E-Module application can no longer be accessed automatically through the application. (2) The E-Modul Discon application is currently difficult to access via the Play Store. (3) During operation, sometimes a force close occurs or it closes automatically when used. (4) The E-Modul Discon application is currently difficult to log in to if the server is full. (5) There is only special science material. (6) Can only be used on Android smartphones, and cannot be used on IOS servers, laptops, or computers. Sinta (2022). Previous research was conducted by Nurnila (2022) with the research title "Development of an Android-based E-Module Discon (E-Module DISROID) on Sound Material for Class IV Students at State Primary School 8 Mamboro", which obtained research results which stated that the use of E- The Android-based Discon Module (DISROID) is effectively used in sound material for fourth-grade students at SD Negeri 8 Mamboro. So the results obtained in this research support previous research where the Android-based

E-Modul Discount (DISROID) on sound material had an effect on student learning outcomes.

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the use of the Android-Based Discon E-Module (DISROID) is effective for sound material on the learning outcomes of class V students at SD Inpres 6 Lolu. This can be seen from the final score or post-test score for the experimental class, which in learning science using the Android-based E-Module Discon (DISROID) obtained an average score of 74.48. In the control class, which studied science using printed science textbooks, they obtained a final score or posttest score with an average of 67.81. Based on the results of the data analysis, it can be concluded that the t-test analysis obtained a significance value of 0.000. Because the significance value (2-tailed) $< \alpha$ ($0.000 < 0.05$), then H_0 is rejected and H_a is accepted, so it is concluded that the use of the Android-based E-Module Discon (DISROID) in sound material is effectively used for the learning outcomes of fifth-grade elementary school students. Presidential Instruction 6 Lolu. It is recommended that future researchers can use it as a reference material for consideration in designing research by examining other variables that influence student learning outcomes, in other materials or with other learning media.

5. REFERENCES

- Adizha, pp (2023). Improving accounting learning outcomes through the implementation of the Student Team Achievement Dvison (STAD) type cooperative learning model assisted by interactive e-module media for class XII AKL students at SMK Negeri 1 Surakarta (thesis). Eleven March University, Surakarta.
- Angga., C. (2022). the influence of activity, liquidity, profitability, and solvency on stock prices (thesis). Faculty of Economics and Business, Pasundan University, Bandung.
- Aprilina, ra (2023). development of an android-based dilan e-module (on-droid) on hot material for fifth-grade students at the Khalifah Palu Islamic Elementary School (thesis). Tadulako University, Palu.
- Asrial, et al. (2020). Ethnoconstructivism e-module to improve perception, interest, and motivation of students in class v elementary school. Indonesian Education Journal, 9(1), 30–41. <https://doi.org/10.23887/jpiundiksha.v9i1.19222>
- Arshal, M., Danial, M., & Hala, Y. (2019). development of e-module learning media for circulatory system material in class Xi Mia SMAN 6 Baru. in the national biology seminar.
- Aziz, f. (2022). Development of social science learning e-modules in an effort to improve the critical thinking skills of class V elementary school students in the Dr Sutomo Mandijara Banjarnegara cluster (thesis). Muhammadiyah University Purwokerto.
- Azizah., wp (2018). development of a Dilan practicum module (discovery learning) for science learning in class v elementary schools. jtjee, 168-183.
- Azizah., WP (2020). development of serially practicum modules (discovery learning) for science learning in elementary schools. basic education professions, 7, 53-64. doi: [doi:10.23917/ppd.v1i1.10817](https://doi.org/10.23917/ppd.v1i1.10817)
- Cholid & Khasanah. (2022). The science learning process at Madrasah Ibtidaiyah (MI) is effective for students. com-serva: journal of research and community service, 2(5), 414-425. doi:10.36418/comserva.v2i5.304
- City nuraeni. (2023). student learning motivation on student learning outcomes. <https://osf.io/cv823/download>
- Farida., MM (2023, July). development of website-based interactive e-modules with an inquiry model to increase students' interest and achievement in learning mathematics in opportunity material. Journal of Mathematics Pedagogy, 9, 113-131. doi <https://doi.org/10.21831/jpm.v9i2.19618>.
- Gunawan, p. (2018). the effectiveness of using e-modules on student activity and learning outcomes. proceedings of the 21st national seminar at Pgrri Palembang University, 261-266.
- Ghozali. (2024). analysis of the effect of stock splits on share prices and share trading volume in companies going public on the Indonesian stock exchange for the 2018-2021 period. al-kharaj:

- journal of sharia economics, finance & business, 6, 156-1566. doi:10.47467/alkharaj.v6i3.3981
- Hosnan, Hamalik & Cahyo. (2022). using the discovery learning method to increase the learning activeness of 5th-grade students at Boro State Elementary School. *journal of educational progress*, 279-299.
- Karmila, (2023). The effectiveness of the Android-based Serli e-module (Seroid e-module) on electrical material on the learning outcomes of class VI students at SDN Bureau (thesis). Tadulako University, Palu.
- Humidity. (2022). Indonesian journal of science education and learning. *Indonesian Journal of Science Education and Learning (JPPSI)*, 89-98.
- Kimianti, & Prasetyo. (2023). development of a multi-modal based e-module to support the mastery of speaking English by young people in Piyak village. *journal of educational research*, 4(4), 1723-1730.
- Livia, ow (2020). The influence of learning resources and interest in reading on the learning outcomes of fifth-grade elementary school students in Cut Nyak Dien, Slawi sub-district, Tegal district (thesis). Semarang State University, Semarang. source from <https://lib.unnes.ac.id/40818/1/1401416397.pdf>
- Marisyah, a., & Firman. (2022). understanding of education. *journal of education and counseling*, 7911-7915.
- Mitta, & Rahayuni. (2020). The influence of the group investigation (GI) learning model assisted by concrete media on the science learning outcomes of fifth-grade elementary school students. *glasser journal of education*, 6(2), 134-141. doi:<http://doi.org/>
- Muhammad, p. (2017). practical guide to preparing learning e-modules. Jakarta: Directorate of High School Development. directorate general of primary and secondary education.
- Nugraha, wulandari, mustakim, lawan, firmansyah, & muin, &. (2023, September-December). application of the problem-based learning model to the material of cube nets and blocks in class V elementary school plus Bakti Nusantara 666. *Journal on Education*, 6, 1994-2003. retrieved from <http://jonedu.org/index.php/joe>
- Oktaviani., AV (2024). development of an interactive e-module regarding solar system material in elementary schools. *Madani: multidisciplinary scientific journal*, 1, 338-348. doi:<https://doi.org/10.5281/zenodo.10437430>
- Rahma, tupa, b. &., Bilotta, Umachandran, Widianingrum, Purwarman, m. &., & Rahayu. (2023). the effectiveness of radec-based e-modules to improve science learning outcomes regarding the states of matter and their changes. *scientific journal of education and learning*, 7(1), 18-27. retrieved from <https://doi.org/10.23887/jipp.v7i1.59281>
- Satyaputra, & aritonang. (2018, April). development of Android-based pneumatic applications as interactive learning multimedia. *journal of ideology kpm unj*, 3, 10-17. re-trrieved from <https://media.neliti.com/media/publicati-ons/308750-pengembanganplikasi-pneumatic-berbasis-4008e885.pdf>
- Satyaputra, aritonang, ichwan, m., hakiky, f., murtuwiyati, & lauren, g. (2018, February). Android-based learning media for class xi network operating systems subjects. *infotama media journal*, 14(1), 15-20.
- Chrysanthemum. (2021). development of electronic module learning media (e-module). proceedings of the national seminar on biology education, 145-156.
- Setyoningtyas, n. M., & Astriani, d. (2022, January). The effectiveness of e-modules based on a deductive approach to human excretory system material in improving student learning outcomes. *pensa e-journal : science education*, 10(1), 135-141. retrieved from <https://ejournal.unesa.ac.id/index.php/pensa>
- Sprott., CA (2022). development of Android-based e-module discon (e-module discoid) sound material for elementary school students. *Journal of Islamic Education and Multiculturalism*, 4(3), 175-191. Retrieved from <https://ejournal.insuriponorogo.ac.id/index.php/scaffolding/article/view/1941/991>
- Sulistina, & Widodo. (2022). effectiveness and role of teachers in the independent curriculum. *lantern: educational scientific journal*, 40-50.
- Sumarsono, & Sianturi. (2023). Canva-based interactive e-module to increase student learning independence in elementary schools. *innovate-ve: journal of social science research*, 3(3), 3437-

3455. retrieved from <https://j-innovatve.org/index.php/innovatve>
- Sumiati, a. (2020). analysis of teaching material development. *archipelago: journal of education and social sciences*, 170-187.
- Wildana., Muliani. (2023). The influence of age-algebra-assisted stem learning on the creative thinking abilities of students at SMK Negeri 1 Le-Bong. *math didactic: journal of mathematics education*, 9, 71-85. retrieved from <https://jurnal.stkipbjm.ac.id/index.php/math>
- Zhafirah, t., & erna, m. (2021). effectiveness of using problem-based learning-based hydrocarbon e-modules to improve students' problem-solving abilities. *proceedings of the national seminar on research and service*, 206-216.