Jurnal Pijar MIPA
https://jurnalfkip.unram.ac.id/index.php/JPM

ISSN 1907-1744 (Print)
ISSN 2460-1500 (Online)

The Effect of Learning Media Assisted by Doratoon App with Cooperative Model on Students Learning Outcomes

Junita Angraini Styaning Rum[1], Abdul Haris Odja[2*], Supartin[2], Mursalin[2], Dewa Gede Eka Setiawan[2], Wahyu Mu'zizat Mohamad[2]

[1]Bachelor of Physics Education Study Program, Department of Physics, Faculty of Mathematics and Natural Science, Universitas Negeri Gorontalo, Gorontalo, Indonesia
[2]Department of Physics, Faculty of Mathematics and Natural Science, Universitas Negeri Gorontalo, Gorontalo, Indonesia
[*]e-mail: abdulharis@ung.ac.id

Received: June 15, 2025. Accepted: July 2, 2025. Published: July 20, 2025

Abstract: Learning media assisted by the Doratoon app, combined with engagement, collaboration, and deeper understanding of the material, while the interactive and visual nature of the app helps accommodate various learning styles. This research aims to determine the effect of using learning media assisted by the Doratoon app with a cooperative model on the learning outcomes of work and simple machines in class VIII at SMP Negeri 11 Gorontalo. This study is an experimental research with a one-group pretest-posttest Design. The sampling technique used in this study is Cluster Random Sampling. This research utilizes VIII C, designated as the experimental class, selected randomly through a lottery method. The data for this study were collected through testing techniques. The results of the analysis of the experimental class yield a gain value of 0.83, which indicates that the sample class falls into the high category. Thus, the use of learning media assisted by the Doratoon application with a cooperative model significantly affects student learning outcomes in the material of work and simple machines.

Keywords: Cooperative Learning; Doratoon; Learning Outcomes.

Introduction

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to possess spiritual and religious strength, self-control, personality, intelligence, noble character, and the skills necessary for themselves and society. Education is not only viewed as an effort to provide information and skill formation, but it is expanded to include efforts to realize individual desires, needs, and abilities, thereby achieving a satisfactory personal and social lifestyle. Education is not merely a means of preparation for future life, but for the life of children who are developing towards adulthood [1].

The effectiveness of the learning process conducted by students in school is not solely derived from the students' potential, but also from the environment or atmosphere of the learning process. Professional teachers must be capable of selecting appropriate models and media for use in the learning process. Teachers sometimes find it challenging to choose which model to apply and face difficulties in implementing suitable learning media. This can impact students' learning outcomes. An inappropriate method may cause students to become bored and disinterested in the learning process, particularly in physics/science education.

According to Pangkali, learning begins with motivation and enthusiasm. In the process of implementing education, teachers are always required to improve their teaching quality. The quality of teachers can be assessed from two aspects, namely the process and the outcome. From the process aspect, a teacher can be considered successful if they can engage most students actively, whether physically, mentally, or socially, in the learning process. Meanwhile, from the outcome aspect, a teacher is deemed successful if the education they provide can change the behavior of most students towards a better mastery of basic competencies [2].

Learning outcomes are conceptualized by experts with varying perspectives. Generally, this concept states that learning outcomes are the abilities acquired by learners through their learning processes or exercises, evidenced by changes in behavior as a result of their learning experiences. In this context, learning outcomes refer to the level of mastery achieved by learners in participating in learning activities, as established by the educational objectives. Learning outcomes within this framework encompass cognitive, affective, and psychomotor domains.

The difficulties often experienced by teachers include explaining a subject to students during the learning process, which is caused by limitations in learning media. Therefore, teachers require media that can be used to clarify the learning process. Limitations in media may arise from a lack of facilities and infrastructure to meet the needs of learning activities. Thus, media use in this context is essential to support the learning activities.

Learning media serve to enhance students' learning experiences, ensuring that they do not become bored during

How to Cite:
J. A. S. Rum, A. H. Odja, S. Supartin, M. Mursalin, D. G. E. Setiawan, and W. M. Mohamad, "The Effect of Learning Media Assisted by Doratoon App with Cooperative Model on Students Learning Outcomes", *J. Pijar.MIPA*, vol. 20, no. 5, pp. 857–863, Jul. 2025. https://doi.org/10.29303/jpm.v20i5.9355

the teaching and learning process. The usefulness of media in teaching and learning activities lies in its ability to facilitate the learning process. In education, the role of media is a vital effort to improve the quality of student education. In teaching and learning activities, learning media is often replaced with terms such as instructional material, audio-visual communication, visual education aids, and explanatory media [3]. Therefore, selecting digital learning media, such as the Doratoon application, can create an enjoyable learning environment and prevent students from feeling bored with the material presented, as Doratoon offers attractive animation features.

Doratoon is a software designed to create audiovisual media (animation videos) that combines various existing software. Using learning media in physics subjects can enhance the effectiveness and efficiency of achieving learning objectives. Appropriate and innovative learning media can capture students' attention, increasing their motivation to learn and making learning enjoyable. The selection of digital learning media, such as the Doratoon application, can create a pleasant learning atmosphere and prevent students from becoming bored with the presented material, as Doratoon includes engaging animation features [4]. Animation-based learning videos can serve as an effective tool for transferring knowledge in education, while also enhancing teachers' skills in imparting knowledge. This can make learning more engaging and help students avoid the boredom associated with monotonous teaching activities [5]. It can be concluded that animated videos serve as a learning medium encompassing two types of media: audio and visual. They are packaged as creatively as possible to enhance motivation and learning outcomes among students in grasping teaching materials while fostering a conducive and pleasant classroom environment. The objective of the audiovisual media (video) assisted by Doratoon is to enliven learning activities, thereby making students feel less bored. Additionally, Doratoon animation can diminish reliance on verbal communication, facilitating better comprehension of the material being taught, thus rendering the learning more engaging and stimulating student motivation. Consequently, attractive learning includes various examples such as texts, images, audio, and videos to boost student enthusiasm throughout the learning process [6].

Doratoon is an educational application that facilitates the teaching process for educators through both online and offline methods. It is a newly developed animation application that is user-friendly and comes with various features. The animations include sound and are capable of movement, thereby providing a refreshing atmosphere in the delivery of educational material [7].

Doratoon-based animation is one of the software solutions with a reliable design for creating audio-visual media (video) animations, incorporating a blend of diverse tools provided. This animation-based application can be easily accessed via its official website without downloading the application first, and it is available for both free and paid usage. The animation models and other cartoon objects make this service particularly suitable for creating educational media, especially for students in the classroom, thereby making the learning process more creative [8]. Researchers facilitate the application of innovative technologies that can be utilized as alternative reinforcement materials in the educational environment. Doratoon is a platform for educators to create learning resources that integrate animated films [9].

Becoming a creative, professional, and enjoyable teacher requires the ability to develop approaches and choose effective learning models. This is particularly important for creating a conducive and enjoyable learning atmosphere. Learning models serve as instruments that assist or facilitate students in acquiring various learning experiences. The function of learning models is to act as guidelines for educators and teachers in teaching. This indicates that every model to be used in teaching determines the tools employed in that teaching. Furthermore, learning models also serve as guidelines for instructional designers and educators in planning and executing teaching activities to achieve learning objectives. However, the reality in the field shows that the learning process is still not optimal. This is because the learning model used is still conventional or predominantly teacher-centered, resulting in students being given insufficient opportunities to construct their knowledge during the learning process, which adversely affects their interest in learning. If this occurs, it will impact students' understanding of the subjects taught or lead to a decline in learning outcomes. One learning model that can allow students to learn collaboratively with peers on structured tasks is the Think-Pair-Share cooperative learning model.

The cooperative learning model, Think Pair Share (TPS), or thinking in pairs to share, is a type of cooperative learning designed to influence student interaction patterns. Frank Lyman developed the think-pair-share teaching technique as a structure for cooperative learning activities. This technique provides students with the opportunity to collaborate with others. The TPS learning model is one of the instructional models that gives students time to think individually and in pairs [10].

Based on Nurnawati, Think Pair Share (TPS) is a type of cooperative learning designed in the form of discussion that can enhance students' thinking abilities, communication skills, and encourage their class participation. This is intended to make students more open with their peers in solving the problems they face [11]. Think-pair-share is a technique that allows students to work independently as well as collaborate with others [12].

The cooperative model of Think Pair Share (TPS) can be utilized to enhance students' critical thinking skills. This provides students with the opportunity to share knowledge. Students are given the chance and freedom to express their opinions and are allowed to disagree with their partner's answers, provided that their reasoning is based on credible sources. With such interactions as discussions, active participation can be achieved during learning. Furthermore, the values embedded in the culture of cooperation are crucial to be preserved and studied, as they can aid in resolving the issues students face. Therefore, the cooperative learning model of Think Pair Share is suitable for sustaining the learning process [13].

Doratoon-based audio-visual media offers advantages in expanding learning media to become more effective, practical, and efficient. Another benefit is the ability to broadcast materials, making learning more effective and allowing students to rewatch the materials until they fully understand. This media can also be used to

convey knowledge by the learning objectives and to develop educators' skills in transferring knowledge, making teaching and learning activities more engaging, and preventing students from feeling bored with these activities. Additionally, this media is easy to use, especially for educators, and comes with unique features [14].

From the theories and several concepts as well as the opinions of the experts mentioned above, it can be synthesized that the TPS model with doratoon-assisted media is a model and medium that can be used to enhance student learning outcomes in physics/science education, as it provides students with more opportunities to think and express opinions both individually and in groups to respond, assist, and share; the engaging learning media makes it easier for students to absorb the material presented.

The results of the observations were conducted at SMP Negeri 11 Gorontalo on VIII class students, where the inappropriate media and the conventional teaching model used, which the teacher still dominates, resulted in students having limited opportunities to construct their knowledge during the learning process, thereby impacting their interest in the learning process. The researcher wishes to further investigate “The Effect of Learning Media Assisted by Doratoon App with Cooperative Model on Students' Learning Outcomes in SMP Negeri 11 Gorontalo” based on the background information provided.

Research Methods

This research employs a quantitative approach, specifically an experimental method with a one-group pretest-posttest design. The study was conducted at SMP Negeri 11 Gorontalo, located on Jalan Kutai, Tamalate Subdistrict, Kota Timur District, Gorontalo Province. This research was conducted for approximately one semester during the odd semester of the 2024/2025 academic year.

The subject of this research is the eighth-class students of SMP Negeri 11 Gorontalo. Class VIII C, consisting of 24 students, is used as the experimental group and the research sample employing the cluster random sampling technique.

The steps are as follows: 1) the experimental class is given a pretest; 2) the experimental class is provided with learning media assisted by Doratoon using a cooperative model; and 3) the experimental class is administered a posttest.

The research data utilized the learning outcomes of pretests and posttests of learners. An objective written assessment consisting of 15 multiple-choice questions was employed as the testing instrument in this study. The data from this research were analyzed using n-gain analysis, hypothesis testing, and tests for data normality.

The Validity Test

The section on validation test instruments is conducted by expert validators who have been assessed based on the learning needs of students outside the research sample [15]. The researchers tested and implemented the learning materials and received a valid designation for trial in the experimental class VIII-C.

Table 1. The Validity Data Results.

No	Device Type	Average	Criteria
1	Instructional Plan	3.48	Valid
2	Student Worksheet	3.47	Valid
3	Teaching Materials	3.47	Valid
4	Learning Outcome Test	3.59	Valid
Average		3.48	Valid

[15]

The test used in this study has also undergone empirical validity testing with valid and reliable students. There are 15 valid questions with a reliability coefficient of 0.417, meeting the criteria for being sufficiently reliable.

The Normality of Data Test

Normality testing serves to determine whether the data is normally distributed or not. The decision-making is based on the value $L_{value} > L_{table}$, then H0 is rejected, and if Lvalue > Ltable, H_0 is accepted. The statistical test used is as follows:

H_0 : The data is normally distributed

H_1 : The data is not normally distributed

The statistical test used in the normality test is the Lilliefors test with a significance level set at 5% (0.05) using the following formula :

$$Z_i = \frac{x - x_2}{s} \text{ [16]}$$

Description:

X = average of the sample used with the formula

S = standard deviation obtained using the formula

The Hypothesis Test

Hypothesis testing is conducted to determine whether the cooperative learning strategy Think Pair Share (TPS), aided by Doratoon, affects learning outcomes. The formula used in this research is as follows:

$$t = \frac{\underline{x} - \mu_0}{\frac{s}{\sqrt{n}}} \text{ [16]}$$

Description:

t shows the calculated t value

$\underline{x}$ shows the average value of the sample

μ_0 shows the hypothesized values

s shows the sample standard deviation

n shows the number of samples

The N-gain Test

The n-gain test, which includes the following formula, is used in this study to evaluate how effectively the use of Doratoon-assisted learning media with a cooperative model enhances learning outcomes.

$$\text{N-gain} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

Table 2. N-Gain Tests Criteria

Criteria	$g \geq 0.7$	High
	$0.3 \leq g \leq 0.7$	Medium
	$g \geq 0.3$	Low

[17]

Results and Discussion

The process after administering the initial test (pretest) and the final test (posttest), findings from the research regarding the effect of using Doratoon-assisted learning media with a cooperative model on the learning outcomes of simple machines and aircraft have been established. The researcher employed n-gain tests, hypothesis tests, and data normality tests to assess the students' learning outcomes.

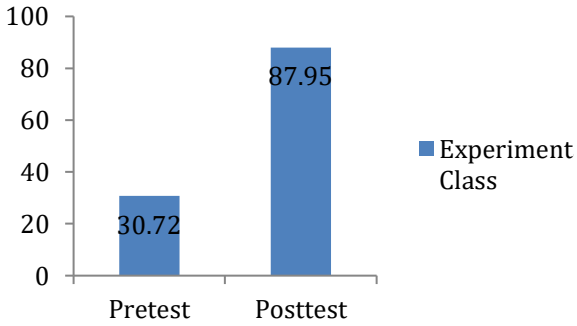

Figure 1. Average Scores of Students

Figure 1 illustrates the implementation process of student learning outcomes through the Think Pair Share learning method assisted by Doratoon media on the concepts of work and simple machines. Based on the pretest and posttest data, there is a difference that reflects the learning outcomes, indicating the influence of the independent variable through the highlighted learning videos, which can enhance students' abilities in the material of work and simple machines.

Table 3. The Normality Test Results

Liliefors Test			
Class	L_{value}	L_{table}	Description
Experimental	0.316	1.711	Normal Distributed

Based on Table 3, the experimental class have values Lvalue (symbol) L_{table} with a significance level of α= 0.05, thus H_0 is accepted and H_1 is rejected. Therefore, it can be concluded that the data from the research is normally distributed.

Table 4. Results of the hypothesis test

Class	T_{value}	T_{table}	Status
Experimental	8,016	1,711	H_0 Accepted

Based on Table 4, it was found that the calculated t-value is greater than the table t-value at a significance level of 0.05 for experimental classes. The experimental class obtained a t-value of 8.016, while the table t-value is 1.711. It can be concluded that H0 is accepted and H1 is rejected. This is evidenced by the posttest results from the class, where there is an increase in the average learning outcomes of students from the pretest scores. The results indicate that the average learning outcomes of students are equal to or greater than the minimum completeness criteria (MCC) score of 70. Thus, implementing the cooperative model Think Pair Share, assisted by a Doratoon, has a significant positive effect on student learning outcomes.

Table 5. Analysis of N-Gain in Student Learning Outcomes

No	Class	N-gain	Criteria
1	Experimental	0,83	High

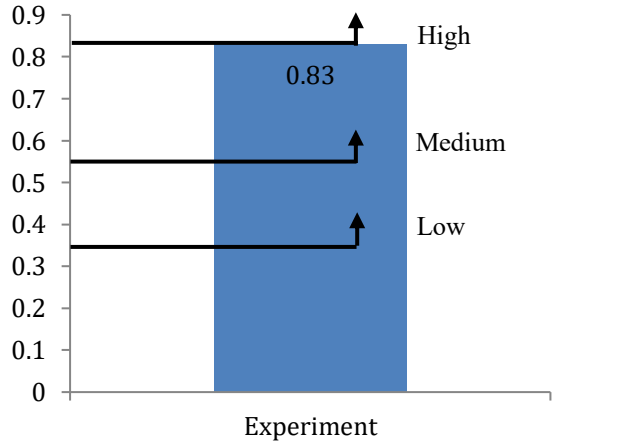

Figure 2. Graph of the course average normalized gain per class.

Based on Table 5 and Figure 2, the n-gain obtained for the experimental class is 0.83, which falls into the high criteria. It can be concluded that there is a significant improvement in student outcomes for the experimental class, categorized as high.

The researcher acts as a facilitator in teaching students to understand the concepts of work and simple machines through learning using Doratoon as a learning medium with the cooperative Think Pair Share model to enhance student learning outcomes. After obtaining the average learning outcomes data through tests, there was an improvement in the learning outcomes of students in the experimental class with high criteria. Thus, it can be concluded that the average score of the posttest is higher than the average score of the pretest for the experimental class. This is due to the mastery of the material provided, which, when related to everyday life, will make it easier for students to comprehend the subject matter presented.

The final test scores (posttest) obtained by students in the experimental class exceeded the MCC at the school, which is a score of 70, indicating mastery. This is due to the fact that student learning outcomes can be improved through learning using media assisted by Doratoon with a cooperative model on the concepts of work and simple machines.

Based on Nurmala, learning outcomes are the abilities possessed by students after they have received their learning experiences. Learning outcomes are used by teachers as a measure or criterion for achieving an educational goal, often referred to as feedback. This can be achieved if students comprehend learning, accompanied by positive changes in behavior. Learning outcomes are the results obtained by students following learning and teaching activities, as well as evidence of success that an individual has achieved, which involves cognitive, affective, and

psychomotor aspects [18]. Based on Dewi et al, learning outcomes serve as one of the indicators of whether a learning process is successful. The higher the learning outcomes attained by students, the more successful the learning process is considered to be. Conversely, if students' learning outcomes are low, it may indicate that the learning process was less effective or possibly unsuccessful [19].

The Think Pair Share (TPS) learning method directs students by grouping them in pairs, which can enhance student interaction, independence, responsibility, and effectiveness in learning. Students are trained to engage in problem-solving and discussing with their partners actively. Think Pair Share emphasizes a specific structure designed to influence student interaction patterns. This structure requires students to collaborate, complement each other, and depend on one another in small groups cooperatively.

The research data analysis was conducted using several tests, namely normality tests, hypothesis tests, and n-gain tests for the experimental class. For normality testing of the data, the Lilliefors test statistic was employed, and this testing was performed using Microsoft Excel, which showed that the normality tests were normally distributed.

Process of determining whether there is a positive impact from the treatment of learning using Doratoon-assisted media with the cooperative Think-Pair-Share model in the experimental class, which was applied to the students' learning outcomes, the researcher conducted a hypothesis test. It was found that t-value > t-table at a significance level of 0.05, leading to the conclusion that H0 is accepted and H1 is rejected. This value was obtained by comparing the average scores of each class with the Minimum Completion Criteria and also from the percentage of post-test scores achieved by the students.

The analysis of this hypothesis concludes that H0 is accepted, where after receiving the treatment of applying the Doratoon-assisted learning media with the cooperative model Think Pair Share, it can influence the learning outcomes of students on the material of work and simple machines. This is based on the high percentage of average scores of students exceeding the MCC score for the experimental class. Based on a reference to the learning device, it was found that providing the same treatment would yield similar results and there were no significant differences in scores. This indicates consistency in the class after the treatment was given. Meanwhile, for students who only achieved scores that do not meet or are not far from the MCC, this is due to some students not paying attention during the learning process and also the inactivity of students within the group.

In the process of examining the extent of the influence on student learning outcomes, a final test was utilized, specifically the N-gain test. The analysis of the course average normalized gain per class, as shown in Figure 2, indicates that the use of Doratoon-assisted learning media with the cooperative Think Pair Share model can enhance student learning outcomes in each class. Furthermore, the results of the single student normalized gain in the experimental class, depicted in Figure 3, show that a greater number of students fall into the high category compared to those in the medium category. This suggests that the use of Doratoon-assisted learning media with the cooperative Think Pair Share model has a quantitative effect on improving learning outcomes across all sample classes.

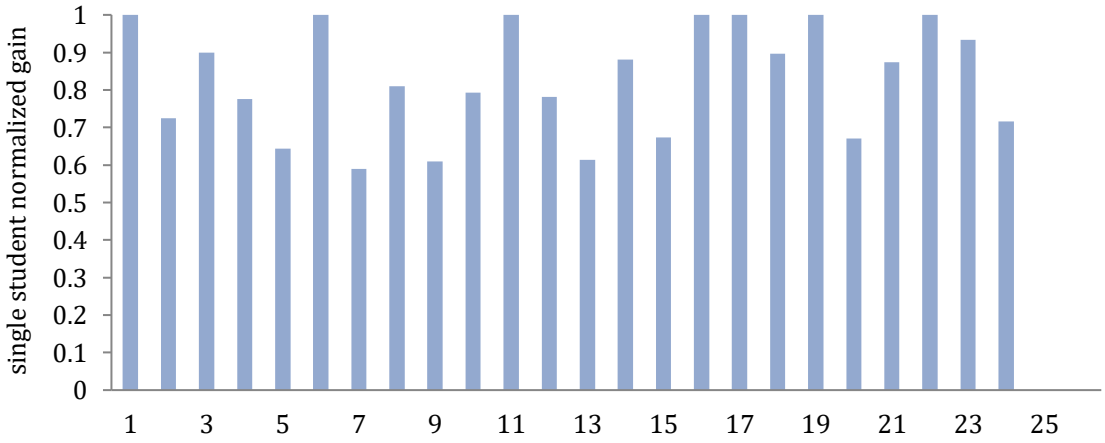

Figure 3. Graph of single student normalized gain for the experimental class

The research conducted is not without challenges. For instance, due to the implementation of the cooperative learning model Think Pair Share, which is not frequently used by teachers in instruction, students have expressed difficulties they encountered when answering questions posed, whether in test questions or while working on the worksheet. This opinion is supported by the statement of Arnidha, that cooperative learning can provide students with time to think, and this strategy has strong potential to empower students' thinking abilities. The enhancement of students' thinking skills will lead to improved learning outcomes [20-23].

During the research in the experimental class, the researcher encountered a respondent who was included in the category of slow learners. Two respondents are classified as slow learners due to their slow learning and thinking processes, as well as their lack of interaction with peers or groups during the teaching and learning process. In this regard, they require more time, repetition, and support to understand and master the subject matter. Thus, the strategy implemented by the researcher to address these slow learners involves approaching them and understanding their preferred learning methods so that they can comprehend the material being taught and solve the

problems present in the worksheet. This also aims to improve the learning outcomes for slow-learning students.

Conclusion

Based on the results of the research conducted on the influence of using Doratoon-assisted learning media with the cooperative Think Pair Share model on the learning outcomes of simple machines and engines, it is indicated through the hypothesis testing criteria that for the experimental class, the t-count value of 8.016 is greater than the t-table value of 1.711. This allows us to conclude that the hypothesis testing shows that the t-count value is greater than the t-table value, which can be interpreted as the use of Doratoon-assisted learning media with the cooperative Think Pair Share model having a positive effect on students' learning outcomes. The use of Doratoon learning media can be applied to various subjects that require visualization and audio, facilitating students in comprehensively learning the material. This research still needs more detailed and closer reliability testing if continued to explore and develop media and teaching materials. Learning needs can be tailored according to the tests being administered.

Author's Contribution

Junita Angraini Styaning Rum: conducted the research, performed data analysis, and wrote the manuscript; Dr. Abdul Haris Odja, S.Pd., M.Pd. and Dr. Supartin, S.Pd., M.Pd.: provided supervision, conceptual guidance, and critical revision of the manuscript; Prof. Dr. Mursalin, M.Si., Dewa Gede Eka Setiawan, S.Pd., M.Sc., and Wahyu Mu'zizat Mohamad, S.Pd., M.Pd.: provided critical review throughout the research and writing process.

Acknowledgements

The author expresses gratitude to the academic community of SMP Negeri 11 Gorontalo for providing the opportunity to conduct this research. Thanks are also extended to the family and all those who have offered support.

References

[1] D. Pristiwanti, B. Badariah, S. Hidayat, and R. S. Dewi, "Pengertian Pendidikan," *Jurnal Pendidikan dan Konseling (JPDK),* vol. 4, no. 6, pp. 7911-7915, Dec. 2022, https://doi.org/10.31004/jpdk.v4i6.9498.

[2] P. Rahmawati and G. A. Fatmala, "Penerapan Model Pembelajaran Kooperatif Tipe Think Pair Share untuk Meningkatkan Hasil Belajar IPA Siswa SMP," *Variabel*, vol. 6, no. 1, pp. 49-54, Apr. 2023, https://dx.doi.org/10.26737/var.v6i1.4209.

[3] C. Kustandi and D. Darmawan, *Pengembangan Media Pembelajaran: Konsep & Aplikasi Pengembangan Media Pembelajaran bagi Pendidik di Sekolah dan Masyarakat*. Jakarta: Prenada Media, 2020.

[4] H. Syahropi, R. G. Hatika, and I. Lestari, "Pengaruh Media Pembelajaran Doratoon terhadap Motivasi Belajar Fisika Siswa," *Journal of Biology, Chemistry, Mathematics and Physics Education*, vol. 1, no. 2, pp. 42-49, Aug. 2024, https://doi.org/10.61761/biochamp.1.2.42-49.

[5] M. P. Fauziah and M. Ninawati, M. "Pengembangan Media Audio Visual (Video) Animasi Berbasis Doratoon Materi Hak dan Kewajiban Penggunaan Sumber Energi Mata Pelajaran PPKn di Sekolah Dasar," *Jurnal Basicedu*, vol. 6, no. 4, pp. 6505-6513, May. 2022, https://doi.org/10.31004/basicedu.v6i4.3257.

[6] S. Fathimatuzzahro, N. Karmila, and F. Anjaswuri, "Pengembangan Media Pembelajaran Berbasis Animasi Doratoon Subtema Perkembangan Teknologi Komunikasi," *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, vol. 10, no. 3, pp. 525-536, Sep. 2024, https://doi.org/10.36989/didaktik.v10i3.3795.

[7] N. Fakhrunnisaa, H. Isnaini, and N. In, "Pengembangan Video Pembelajaran Berbasis Doratoon Materi Sejarah Peradaban Islam SMA," *Asatiza: Jurnal Pendidikan*, vol. 5, no. 2, pp. 119-130, May. 2024, https://doi.org/10.46963/asatiza.v5i2.1347.

[8] I. L. Liu, D. D. Samo, and F. A. Halim, "Pengembangan Media Audio Visual (Video) Animasi Berbasis Doratoon pada Materi Peluang untuk Siswa Kelas X SMA Negeri 5 Kupang," *Mandalika Mathematics and Educations Journal*, vol. 7, no. 2, pp. 245-259, Apr. 2025, https://doi.org/10.29303/jm.v7i2.7109.

[9] Y. Simanullang, L. J. Ananda, I. Gultom, R. Tamba, and A. Gandamana, "Development of Discovery Learning Based Animation Video Media Assisted by the Doratoon Application on Theme 8 Sub-theme 1 Class V to QA 2022/2023," *Indonesian Journal of Advanced Research*, vol. 2, no. 11, pp. 1535-1544, Nov. 2023, https://doi.org/%2010.55927/ijar.v2i11.6725.

[10] A. Sulistio and N. Haryanti, *Model Pembelajaran Kooperatif (Cooperative Learning Model)*. Purbalingga: Eureka Media Aksara, 2022.

[11] L. Zulfa, R. A. Safari, A. N. Damayanti, and R. Setiawaty, "Analisis Model Pembelajaran Kooperatif Tipe Think Pair Share dalam Meningkatkan Kerjasama dan Hasil Belajar Siswa Systematic Literature Review," *Seminar Nasional LPPM Ummat*, vol. 1, pp. 705-719, Aug. 2022, https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://journal.ummat.ac.id/journals/55/articles/9799/public/9799-33802-1-PB.pdf&ved=2ahUKEwixrJaSn5eOAxUM1zgGHfPMEpAQFnoECCgQAQ&usg=AOvVaw3fCvXnuf7iXE3-EGC6IE1o.

[12] A. H. Batara, D. A. Siregar, and Mutiara, "Pengaruh Penggunaan Model Pembelajaran Think Pair Share terhadap Hasil Belajar Fisika pada Materi Pokok Gerak Melingkar di Kelas XI SMA Negeri 5 Padangsidimpuan," *Jurnal Physics Education (PhysEdu)*, vol. 7, no. 1, pp. 19–33, Jun. 2025, doi: https://doi.org/10.37081/physedu.v7i1.5245.

[13] Z. Apdolipah, Yusnaidar, F. Dewi, and Risdalina, "Analisis Penerapan Model Pembelajaran Think Pair Share dan Korelasinya terhadap Kemampuan Berpikir Kritis Siswa," *Journal of The Indonesian Society of Integrated Chemistry*, vol. 15, no. 1, pp.

37–47, Jun. 2023, https://doi.org/10.22437/jisic.v15i1.25413.
[14] I. Rahmadhani and R. A. Fikroh, "Development of Learning Videos on Petroleum Materials Using Dora Toon Web Apps for Class XI High School Students," *JIPI (Jurnal IPA dan Pembelajaran IPA)*, vol. 8, no. 2, pp. 103-122, Jun. 2024, https://doi.org/10.24815/jipi.v8i2.37959.
[15] N. A. Rahim, A. H. Odja, R. Uloli, Mursalin, M. K. Umar, and T. Abdjul, "Development of Learning Tools in the Cooperative Think Pair Share (TPS) Model Integrated with Huyula Values Reviewed from the Cognitive Aspect," *Science Education Journal (SEJ)*, vol. 8, no. 1, pp. 57-75, May. 2024, https://doi.org/10.21070/sej.v8i1.1650.
[16] Sudjana, *Metode Statistika*. Bandung : Tasito, 2020.
[17] Wahab, Junaedi, and M. Azhar, "Efektivitas Pembelajaran Statistika Pendidikan menggunakan Uji Peningkatan N-gain di PGMI," *Jurnal Basicedu*, vol. 5, no. 2, pp. 1039-1045, Mar. 2021, https://doi.org/10.31004/basicedu.v5i2.845.
[18] U. Manshur and A. Daniyullah, "Penerapan Metode Think Pair Share untuk Meningkatkan Hasil Belajar Bahasa Arab Madrasah Tsanawiyah Nurul Jadid," *Jurnal Dimensi Pendidikan dan Pembelajaran*, vol. 10, no. 1, pp. 71-83, Dec. 2022, http://dx.doi.org/10.24269/dpp.v10i1.6189.
[19] M. Jannah and Nurdiyanti, "Pengaruh Pembelajaran Online Berbantuan Google Classroom terhadap Hasil Belajar Peserta Didik pada Materi Sistem Peredaraan Darah pada Manusia Kelas XI SMA Buq'atun Mubarakah Makassar," *Jurnal Riset dan Inovasi Pembelajaran*, vol. 1, no. 1, pp. 75-84, Apr. 2021, https://doi.org/10.51574/jrip.v1i1.21.
[20] M. Makhrus, J. Rokhmat, K. Kosim, and A. Harjono, "Development of learning media and online test based smartphone android in physics learning on work and energy topic," *J. Pijar Mipa*, vol. 17, no. 3, pp. 420–423, 2022. doi: 10.29303/jpm.v17i3.3487
[21] A. K. Pratiwi, M. Makhrus, and M. Zuhdi, "The effectiveness of learning media based on the guided inquiry model to improve students science literature skills and scientific attitudes," *J. Pijar Mipa*, vol. 16, no. 5, pp. 636–639, 2021. doi: 10.29303/jpm.v16i5.3041
[22] R. S. Kusumaningrum and I. Nuriadin, "Pengaruh Pendekatan Matematika Realistik berbantu Media Konkret terhadap Kemampuan Representasi Matematis Siswa," *Jurnal Basicedu*, vol. 6, no. 4, pp. 6613-6619, May. 2022, https://doi.org/10.31004/basicedu.v6i4.3322.
[23] I. Depiyahani and F. Azra, "Development of android-based learning media applications on mole concept topics for high school students," *J. Pijar Mipa*, vol. 18, no. 2, pp. 194–200, 2023. doi: 10.29303/jpm.v18i2.4725