

Inshot Video and Science Learning Outcomes: The Concept of the Human Circulatory System

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ABSTRACT

The ability of students to ask or answer questions from the teacher is generally not based on reasoning. Therefore, we need a way to help the development of student reasoning by using empowering thinking through questions (PBMP). Therefore, students gain knowledge from the teacher and are actively involved in the science learning process. This study aimed to determine students' science learning outcomes using the PBMP model with the assistance of the Inshot video. This type of research is quasi-experimental. The participants in this study were 70 students, with 35 for the experimental group and 35 students for the control group. The results showed that learning outcomes with the PBMP strategy were higher with an average score of 81.00 compared to conventional ones with 57.05. Meanwhile, the ANCOVA test results showed a significant difference between student learning outcomes using the PBMP and conventional models. Thus, the PBMP model combined with the Inshot video can be recommended for improving student learning outcomes.

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1. INTRODUCTION

The quality of learning in schools strongly influences student learning outcomes. Learning outcomes are a tangible manifestation of a competency that is considered to facilitate students in academic achievement, positive social behaviour, and social relationships (Mahoney et al., 2018). Learning outcomes must be relevant to learning objectives in knowledge, skills and attitudes (Seufert et al., 2021). Learning outcomes help connect the world of education and work (Brooks et al., 2014). Changes in a person can be seen in attitudes and behaviour and even learning outcomes as measured by giving tests (Getie, 2020). In this case, cognitive learning outcomes are students' abilities in learning a concept and are expressed in scores through test results (Pyun et al., 2019). The level of success in learning achievement can allow students to explore knowledge in various experiences (Coman et al.,

2020). Cognitive learning outcomes are related to learning science in solving problems and how to demand students to be more active in learning (Shi et al., 2021).

Students' low cognitive learning outcomes are caused by several factors, such as traditional learning methods and media, so students are less active in developing scientific skills (Hurlbut, 2018; Enneking et al., 2019). Teachers have not been able to relate scientific phenomena and the delivery of learning materials properly to be understood by students (Darling-hammond et al., 2019). In addition, teachers do not yet understand the needs needed by students in the current era to train students' communication skills (Jeffrey et al., 2014). In response to the facts, we offer a learning model, namely empowering thinking through questions (PBMP), with the hope of helping teachers and students improve student learning outcomes, especially science learning. The PBMP model can empower critical thinking skills to answer questions that are arranged systematically. Learning outcomes will be influenced by learning models, curriculum design, and teaching (Jude et al., 2014). PBMP can trigger the development of students' thinking skills to practice new skills (Khasanah & Astuti, 2018). This strategy comes from Crown (1989), which explains that the purpose of learning is to train thinking activities. The focus of thinking activities in learning is higher-order thinking. PBMP is one of the learning strategies developed by Aloysius Duran Corebima in 1985. PBMP was developed based on Diane M. Bunce's thinking which is still related to teaching science by way of students learning. Based on Bunce (1996), students must become participants in the lesson (Astuti et al., 2017).

Empowerment of higher-order thinking skills has not been carried out effectively (Wartono et al., 2018; Kwangmuang et al., 2021). Biology learning in elementary schools is more about exploring living things around, which emphasizes the development of the ability to memorize scientific concepts, principles, and terms (Shen et al., 2018). Given the importance of the biological learning process, it is essentially a communication process in delivering messages from the source of the message to the recipient of the message. Biology learning media is made as a communication tool so that what is intended can be accepted by students with full intentions and there are no misconceptions (Suwono et al., 2021).

The media that can be used is audio-visual media which can make it time-efficient. It makes it easier for students to understand the material better. The media used in communication in learning are very diverse in type and form. The Inshot video editing application is perfect for beginners and those who want to edit videos for learning. Therefore, the users will not be disturbed when uploading edited videos and be more effective. Several studies have suggested and mentioned that many educators in teaching use several e-learning applications (Oyediran et al., 2020). However, there is still minimal research on Inshot video-based learning because this is the latest application. Along with the needs of students, it can be applied to current learning. Therefore, with the current state of COVID-19, students who have to learn from a distance can no longer go to school and can be replaced with video media for learning. Teachers must make exciting media or videos in the learning process in the current era. Moreover, many schools in Indonesia are still implementing distance learning programs. Therefore, some online applications have sprung up to answer the needs of schools so that students continue to learn and teachers continue to teach. It is still found that many teachers are still not proficient in using media, especially Inshot video for video editing. It is because it requires skills in packaging materials to make a good video. Besides, making teaching materials with Inshot videos is tricky, so teachers prefer other, more accessible media. Using this Inshot video application requires good skills, producing high-quality learning media. The Inshot video application is here to assist online learning activities in becoming more effective and efficient, accommodating learning (Syukhria & Nurhamidah, 2021).

Based on the facts, the research using PBMP with video Inshot on student science learning outcomes has not been studied in depth until now. The PBMP research is mainly combined with other variables, for example, students' critical thinking (Haerullah & Tamalene, 2017), metacognition (Erilin et al., 2021), and retention (Wahyuni, 2019). Thinking empowerment during learning, including biology science, is essential and strategic (Corebima, 2006). PBMP is not only informed directly but also through structured questions that have been designed in writing in student worksheets (Corebima, 2001). Therefore, through this research, it will be explored further and in PBMP with the assistance of the

Inshot video in improving students' science learning outcomes. PBMP research was carried out in the learning process in the classroom, in which 1) few students asked in a meeting even in almost every meeting, no students asked questions, 2) few students argued using their language, and 3) students quickly forgot the concepts that had been obtained. Therefore, when the teacher asked about the concept, many students were silent. 4) students tended not to participate in learning activities because they were busy with their activities, so they did not pay attention to the teacher's directions or explanations. Based on the existing description, the purpose of this study was to find out the results of students' science learning using the PBMP model with the assistance of the Inshot video.

2. METHOD

This research is a quasi-experimental research type with a pretest-posttest design. The form of the design used in this study is shown in Table 1.

Table 1 Pretest-posttest research design

Group	Pretest	Treatment	Posttest
E	Xe	A	Ye
K	Xk	B	Yk

Where

- E : Experimental Group
- K : Control Group
- B : Teaching with the PBMP model
- Xe : Pretest scores for the experimental group
- Ye : Pretest scores for the experimental group
- Xk : Pretest scores for the control group
- Yk : Posttest scores for the control group

This research was conducted on 5th-grade students in one of the elementary schools in Ambon City. The number of samples used was 70 students consisting of 35 students in the experimental class and 35 students in the conventional class. There were 15 male students and 20 female students in the experimental class. There were 18 male students and 17 female students in the control class. The average age of 5th-grade students was 10-11 years. Determination of the sample was done randomly. The instrument used to obtain data about students' science learning outcomes was a diagnostic test consisting of one case. There are three stages of structured questions. The number of questions given was eight questions. The instrument used had been validated by two biology learning experts from Pattimura University. It was tested on 100 students from 5 elementary schools in Ambon City. The PBMP patterned learning model was applied in class A, and the conventional learning model was applied in class B. Student learning outcomes were integrated into the essay test and measured at the pretest and posttest.

The research procedure followed the steps through pretest and posttest activities in the experimental and control groups. The pretest was conducted to determine the students' science learning outcomes before implementing the PBMP and Conventional learning models. The data was collected using a test technique done individually in a class by students. Pretest activities in the experimental and control groups determined learning outcomes after students participated in all learning activities. Each class amounted to 35 people as respondents. The validation test was carried out to find out the differences in learning outcomes in each class. In this preparatory stage, student worksheets were prepared to be distributed after the teaching process was carried out. At the implementation stage, the learning process was carried out in 4 meetings according to the depth of the material. After that, it was continued by giving question sheets to students to work on. The questions given were oriented to the thinking power of students during the learning process, which was carried out with the assistance of Inshot videos.

The data analysis technique used the prerequisite test. The normality data analysis used the Kolmogorov-Smirnov test, and homogeneity data analysis used the F-test. Meanwhile, the hypothesis test was carried out using ANCOVA. Before testing the hypothesis, several requirements must be met and need to be proven. The requirements are, 1) the data being analyzed must be normally distributed and 2) the data must be homogeneous. Research data analysis was analyzed for hypothesis testing with ANCOVA in the SPSS statistic 23 programs. Based on this data analysis, it was known which learning strategy had the most potential to affect student learning outcomes and the differences in PBMP learning for different students related to the learning strategies applied.

3. FINDINGS AND DISCUSSION

The results of data analysis indicate that the PBMP learning strategy has more potential to influence student outcomes than conventional strategies. Therefore, it can be explained that there are differences in improving the learning process. Based on the results of the analysis of covariance, it can be explained that the learning model obtained the value of $p = 0.000$, which is smaller than the value of 0.05. There is a difference in student learning outcomes between those given the PBMP patterned learning strategy combined with conventional learning. Thus, it is concluded that there is an influence of PBMP learning strategies on students' science learning outcomes. Data on the value of students' cognitive learning outcomes show that the PBMP experimental group is superior in the pretest and posttest aspects compared to conventional learning, shown in Figure 1.

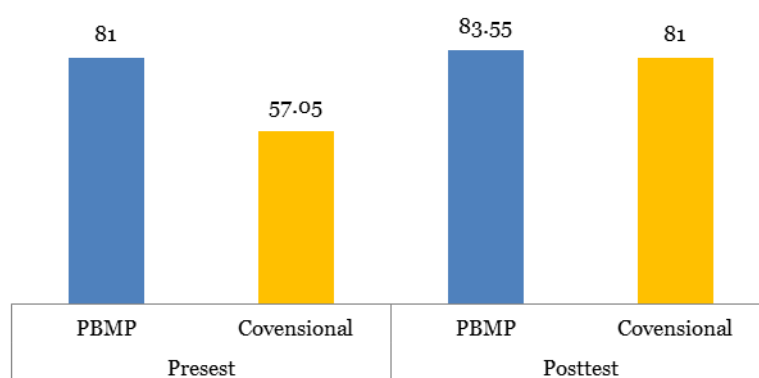


Figure 1 Results of pretest and posttest in PBMP and conventional classes

The data on the value of students' cognitive learning outcomes shows that the PBMP experimental group is superior in the pretest and posttest aspects compared to conventional learning, shown in Table 2. This test was used to decide whether the hypothesis was accepted or rejected. Following the results of the calculation of the normality test of the pretest data and posttest data of the experimental class, it was concluded that the data are normally distributed. In the normality test, the pretest of learning outcomes resulted in a sig value of 0.183 and a posttest of 0.528 in the experiment class, then the H_0 was accepted. The normal test of the pretest data for student learning outcomes obtained a sig value of 0.130 and a posttest of 0.200 in the control class. Therefore, it can be concluded that the data is normally distributed. It means that the null hypothesis states that the pretest and posttest scores in the experimental class and control class are normally distributed. The description can be shown in Table 2.

Table 2 Data normality test results

Variable	Kolmogorov-Smirnov		Asymp, Sig (2-tailed)		Interpretation
	Experiment Class	Control Class	Experiment Class	Control Class	
The Pretest Result of learning	0.029	0.130	0.183	0.201	Normal
The Posttest Result of Learning	0.406	0.200	0.528	0.239	Normal

The test data shows that the pretest of student learning outcomes is significant because the significant value is more than 0.05, namely 0.0918 and $0.528 > 0.05$, so the data are homogeneous. The description can be shown in Table 3.

Table 3 Data homogeneity test results

Variable	F	Dfl	Dfl	Sig	Interpretation
The Pretest Result of learning	0.62	1	42	0.918	Homogen
The Posttest Result of Learning	0.148	1	42	0.528	Homogen

The prerequisite test (normality and homogeneity tests) shows that the two classes are normally distributed and have homogeneous variance. Then hypothesis testing was carried out using the ANCOVA test, which aimed to see the effect of the PBMP learning model on student learning outcomes. The results of the ANCOVA test of student learning outcomes in the treatment of the PBMP learning model are shown in Table 4.

Table 4 ANCOVA test results of PBMP learning model influence student learning outcomes

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	4586.219a	2	2293.110	24.342	.000
Intercept	2555.501	1	2555.501	27.128	.000
Pretest	122.195	1	122.195	1.297	.262
Learning Model	4537.928	1	4537.928	48.172	.000
Error	3673.900	39	94.203		
Total	206707.000	42			
Corrected Total	8260.119	41			

These results measure the value of $\text{sig} = 0.000$, which is smaller than $\text{sig} = 0.05$. It means that the learning model affects science learning outcomes. In the learning model, it can be seen that $F_{\text{count}} = 48,172$ with a significance of 0.000, far below the value of $\text{sig} < 0.05$. Then, H_0 is rejected while H_a is accepted, so it can be concluded that there is a difference in learning outcomes between those who take part in learning using the PBMP model and the conventional model. The average corrected score for learning outcomes is in Table 5.

Learning using the PBMP model with the assistance of the Inshot video turned out to affect student learning outcomes on the material of the circulatory organ. The ANCOVA test analysis on student learning outcomes between the experimental and control classes obtained a significant level value of 0.000 ($p = < 0.05$). Therefore, it can be concluded that the PBMP model influences student learning outcomes. It is evident from the descriptive data of research results by looking at students who take

part in learning using the PBMP model showing the average value of learning outcomes of 83.55 and learning outcomes of 81.00, while the average value of control class students is 57.05, as shown in Table 5.

Table 5 The Average of corrected learning outcome scores

Learning Model	Pretest	Post test	Difference	Corrected Average
ETTQ	73.81	81.00	7,19	84.93
Conventional	80.00	57.05	22,95	77.24

It shows the effect on the class that used the PBMP model. It means that the average value of the experimental class is higher than the control class. The results of the ANCOVA known that the significance level value in the ANCOVA test was 0.000 ($p = <0.05$), then H_0 was accepted. Therefore, it can be concluded that the hypothesis states that the influence of the PBMP model on student learning outcomes is accepted. The effect of PBMP on the science learning outcomes of circulatory organs in humans is reviewed in terms of differences in learning approaches. The experimental class was taught using the PBMP model. An average of 80 is obtained. Video Inshot on the human circulatory system can be shown in Figure 2.



Figure 2 Inshot video, a) The theme of the human circulatory system, b) Circulatory organs

The learning model affects learning outcomes because all the behaviours that students have result from the learning process. The changes include behavioural aspects and learning outcomes in the classroom must be implemented into situations outside of school. Students can transfer the learning outcomes into real societal situations through questions that significantly affect student learning outcomes. In the learning carried out, students are trained to make questions and answer questions. Students were trained to think by designing various knowledge gained after learning in class. Thus, it can be combined with learning models to see student learning outcomes.

A learning model is a plan or pattern that can shape a curriculum, design learning materials, and guide learning in the classroom (Richards, 2013). Learning models can be used as patterns of choice. Teachers may choose appropriate and efficient learning models to achieve their educational goals. The application of the PBMP pattern helps students formulate questions and seek answers to questions to solve the problems given. The characteristic of the PBMP pattern is a learning strategy that is carried out without an informative learning process. The activities are carried out through a series of questions written on the PBMP sheet. Students are trained to find relevant concepts and are encouraged to think convergently and divergently. Questions have a vital role in the learning process. The goal is to determine the extent to which the learning material has been understood by students or to bring students to an understanding of the learning material under the learning objectives. However, the primary purpose of asking questions in the learning process is to increase students' thinking levels, check students' understanding, and student learning participation. This pattern is implemented in the

form of a student sheet containing a series of questions to reconstruct students' understanding (Chin & Osborne, 2008).

One way to improve students' reasoning is to encourage questions about the thinking process. The PBMP pattern is a learning pattern implemented in a student sheet, all of which contain question and command sentences. The questions designed in writing are a series of low-level questions to high-level questions. With these questions, students are asked to find answers. The answers to these questions will form a complete concept owned by students. It shows that students acquire knowledge by their efforts by constructing several separate pieces of information into a whole concept. The advantage of learning with PBMP is that it can bridge the creation of problems and the submission of questions by students (Mone et al., 2021). Questions can encourage students to think more broadly and engage in ongoing learning.

Besides containing questions, the PBMP sheet can also contain a practical work procedure that students must carry out. Work procedures are formulated with command sentences to help students understand a concept. Elementary school science learning that uses the PBMP pattern has proven to empower students' reasoning. The PBMP pattern is a very efficient way of empowering students, as Corebima (1999) reported. According to Bomce (1996), related to teaching, the way students learn is said to help them think, help them formulate questions, and help them find answers to questions. In this case, the keyword used helps not make anything. Therefore, the PBMP sheet only contains commands, questions, and informative sentences. PBMP is a constructivist learning pattern that is accustomed to learning through written questions and reduces the informative learning process to train students to be independent in building concepts through written questions. The teacher does not have to help students constantly, but only as a facilitator to explain questions that students do not understand. As an alternative to overcoming the weaknesses faced by teachers in the field, it is recommended to use a suitable learning model or strategy to be applied in science learning to optimize the learning process and increase the capacity of students' scientific concepts and reasoning.

CONCLUSION

Based on the results of research and discussion, it can be concluded that there are differences in science learning outcomes between groups of students who are taught using the PBMP learning model and groups of students who are taught using conventional models. The average science learning outcome of the experimental group students was 81.75, while the average science learning outcomes of the control group students were 75.20. This difference indicates that using the PBMP learning model positively affects students' science learning outcomes compared to conventional teaching models. Thus, the PBMP model combined with the Inshot video can improve student learning outcomes. The suggestions are as follows: a) For teachers to choose a PBMP learning model as an alternative in choosing an innovative learning model to create a learning atmosphere. It can actively involve students through the discovery process to develop learning in a direction that can ultimately improve students' learning outcomes. b) For school principals, it is expected to provide motivation and guidance to teachers to always seek and utilize the PBMP learning model intensively to improve student learning outcomes. 3) Inshot videos can collaborate with other variables to improve student learning outcomes for further research. The Inshot video application is the latest media and has not been explored and researched more in classroom learning during the current covid-19 pandemic.

REFERENCES

- Astuti, D., Khasanah, U., & Romadon, S. (2017). The effect of thinking empowerment by questioning (teq) through team-assisted individualization (TAI) learning model to metacognitive and learning achievement. Proceedings of Ahmad Dahlan International Conference on Mathematics and Mathematics Education Universitas Ahmad Dahlan, Yogyakarta, 13-14 October 2017, October, 13-14.
- Brooks, S., Dobbins, K., Scott, J. J. A., Rawlinson, M., & Norman, R. I. (2014). Learning about learning outcomes: The student perspective. *Teaching in Higher Education*, 19(6), 721-733.

- <https://doi.org/10.1080/13562517.2014.901964>
- Chin, C., & Osborne, J. (2008). Students' questions: A potential resource for teaching and learning science. *Studies in Science Education*, 44(1), 1–39. <https://doi.org/10.1080/03057260701828101>
- Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability (Switzerland)*, 12(24), 1–22. <https://doi.org/10.3390/su122410367>
- Corebima, A.D. 2001. Pola pengembangan lembar PBMP (TEQ) dalam Pembelajaran IPA-BIOLOGI. Makalah disajikan dalam Lokakarya PBMP [The pattern of developing PBMP sheets (TEQ) in Science-BIOLOGY Learning. Paper presented in PBMP Workshop], Malang, 31 Agustus – 1 September.
- Darling-hammond, L., Flook, L., Cook-harvey, C., Barron, B., Flook, L., Cook-harvey, C., Barron, B., Darling-hammond, L., Flook, L., Cook-harvey, C., & Barron, B. (2019). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 0(0), 1–44. <https://doi.org/10.1080/10888691.2018.1537791>
- Enneking, K. M., Breitenstein, G. R., Coleman, A. F., Reeves, J. H., Wang, Y., & Grove, N. P. (2019). The Evaluation of a hybrid, general chemistry laboratory curriculum: impact on students' cognitive, affective, and psychomotor learning [Research-article]. *Journal of Chemical Education*, 96(6), 1058–1067. <https://doi.org/10.1021/acs.jchemed.8b00637>
- Erlin, E., Rahmat, A., Redjeki, S., & Purwangsih, W. (2021). Analisis berbagai strategi dan model pembelajaran yang dapat memberdayakan kemampuan metakognitif pada pembelajaran biologi [Analysis of various strategies and learning models that can empower metacognitive abilities in biology learning]. *Bioed: Jurnal Pendidikan Biolog*, 9(2), 30-40
- Getie, A. S. (2020). Factors affecting the attitudes of students towards learning English as a foreign language. *Cogent Education*, 7(1), 0–37. <https://doi.org/10.1080/2331186X.2020.1738184>
- Haerullah, A., & Tamalene, M. N. (2017). PBMP untuk pemberdayaan keterampilan berpikir kritis siswa multi-etnis [PBMP for empowering critical thinking skills of multiethnic students]. *Bioedukasi*, 10(2), 29-34
- Hurlbut, A. R. (2018). Online vs. traditional learning in teacher education: a comparison of student progress. *American Journal of Distance Education*, 32(4), 248–266. <https://doi.org/10.1080/08923647.2018.1509265>
- Jeffrey, L., Milne, J., Suddaby, G., & Higgins, A. (2014). Blended learning: how teachers balance the blend of online and classroom components. *Journal of Information Technology Education: Research*, 13, 121–140. <https://doi.org/10.28945/1968>
- Jude, L., Kajura, M., & Birevu, M. (2014). Adoption of the SAMR model to assess ICT pedagogical adoption: A Case of Makerere University. *International Journal of E-Education, e-Business, e-Management and e-Learning*, 4(2). <https://doi.org/10.7763/ijeeee.2014.v4.312>
- Khasanah, U., & Astuti, D. (2018). Developing mathematics learning model of thinking empowerment by question (TEQ) with TAI Setting to improve students ' metacognition ability. *International Journal of Active Learning*, 3(2), 80–85. <http://journal.unnes.ac.id/nju/index.php/ijal>
- Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. *Heliyon*, 7(6), e07309. <https://doi.org/10.1016/j.heliyon.2021.e07309>
- Mahoney, J. L., Durlak, J. A., & Weissberg, R. P. (2018). An update on social and emotional learning outcome research. *Phi Delta Kappan*, 100(4), 18–23. <https://doi.org/10.1177/0031721718815668>
- Mone, M., Manu, T. S. ., & Meha, A. M. (2021). Pengaruh model pemberdayaan berpikir melalui pertanyaan (pbmp) terhadap kemampuan berpikir kritis siswa Di Smp Negeri 10 Kupang Tahun Ajaran 2019/2020 [The influence of the thinking empowerment model through questions (pbmp) on students' critical thinking skills at SMP Negeri 10 Kupang for the 2019/2020 academic year]. *Indigenous Biologi: Jurnal Pendidikan Dan Sains Biologi*, 4(1), 17–25. <https://doi.org/10.33323/indigenous.v4i1.68>
- Oyediran, W. O., Omoare, A. M., Owoyemi, M. A., Adejobi, A. O., & Fasasi, R. B. (2020). Prospects and

- limitations of e-learning application in private tertiary institutions amidst COVID-19 lockdown in Nigeria. *Heliyon*, 6(11). <https://doi.org/10.1016/j.heliyon.2020.e05457>
- Pyun, D. Y., Keng, C., Wang, J., & Koh, K. T. (2019). Testing a proposed model of perceived cognitive learning outcomes in outdoor education. *Journal of Adventure Education and Outdoor Learning*, 00(00), 1–15. <https://doi.org/10.1080/14729679.2019.1660191>
- Richards, J. C. (2013). Curriculum approaches in language teaching: Forward, central, and backward design. *RELC Journal*, 44(1), 5–33. <https://doi.org/10.1177/0033688212473293>
- Seufert, S., Guggemos, J., & Sailer, M. (2021). Technology-related knowledge, skills, and attitudes of pre- and in-service teachers: The current situation and emerging trends. *Computers in Human Behavior*, 115, 106552. <https://doi.org/10.1016/j.chb.2020.106552>
- Shen, K. M., Li, T. L., & Lee, M. H. (2018). Learning biology as ‘Increase ones’ knowledge and understanding’: studying Taiwanese high school students’ learning strategies in relation to their epistemic views and conceptions of learning in biology. *International Journal of Science Education*, 40(17), 2137–2157. <https://doi.org/10.1080/09500693.2018.1522013>
- Shi, Y., Zhang, J., Yang, H., & Yang, H. H. (2021). Effects of interactive whiteboard-based instruction on students’ cognitive learning outcomes: a meta-analysis. *Interactive Learning Environments*, 29(2), 283–300. <https://doi.org/10.1080/10494820.2020.1769683>
- Suwono, H., Prasetyo, T. I., Lestari, U., Lukiati, B., Fachrunnisa, R., Kusairi, S., Saefi, M., Fauzi, A., & Atho’Illah, M. F. (2021). Cell Biology Diagnostic Test (CBD-Test) portrays pre-service teacher misconceptions about biology cell. *Journal of Biological Education*, 55(1), 82–105. <https://doi.org/10.1080/00219266.2019.1643765>
- Syukhria, R., & Nurhamidah, D. (2021). Aplikasi inshot sebagai media pembelajaran jarak jauh pada pelajaran bahasa indonesia [Inshot application as a distance learning media in Indonesian lessons]. *Jurnal Penelitian Pendidikan*, 21(1), 34-40
- Wartono, W., Takaria, J., Batlolona, J. R., Grusche, S., Hudha, M. N., & Jayanti, Y. M. (2018). Inquiry-discovery empowering high order thinking skills and scientific literacy on substance pressure topic. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 7(2), 139–151. <https://doi.org/10.24042/jipfalbiruni.v7i2.2629>
- Wahyuni, V. A. (2019). Pengaruh model pembelajaran guided inquiry terhadap kemampuan berpikir kritis dan retensi peserta didik pada konsep sistem indera manusia (studi eksperimen di kelas xi mia man 1 tasikmalaya tahun ajaran 2017/2018) [The effect of guided inquiry learning model on critical thinking skills and retention of students on the concept of the human sense system (experimental study in class xi mia man 1 tasikmalaya academic year 2017/2018)]. *Bioedusiana*, 4(2), 72-79.

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