

The Effect of Encyclopedia and Discovery Learning to Improve Learning Motivation and Mastery of Concepts in Student

Neli Dwi Septi Anggraeni^{1*}, & Bernadetta Octavia²

¹Master of Biology Education, Yogyakarta State University, Indonesia

²Department of Biology, Yogyakarta State University, Indonesia

*Corresponding email: nelidwisa@gmail.com

Received: 23 November 2023 Accepted: 25 December 2023 Published: 27 December 2023

Abstract: The Effect of Encyclopedia and Discovery Learning to Improve Learning Motivation and Mastery of Concepts in Student. Objectives: This study aims to determine effectiveness of encyclopedia structure function of plant tissue and discovery learning to increase learning motivation and mastery of concepts in grade XI MA. **Methods:** Techniques of data collection in learning motivation with questionnaires and mastery of concepts using tests. Tests and questionnaires were collected twice, namely pretest and posttest. The data obtained carried out prerequisite test analysis with normality and homogeneity test. Furthermore, paired t-test with SPSS V.15. **Findings:** The results of statistical analysis showed that $P\text{-value} < 0.05$ that the encyclopedia structure function of plant tissue and discovery learning was effective in increasing student learning motivation and increasing mastery of concepts in grade XI MA. **Conclusion:** Effectiveness of encyclopedia structure function of plant tissue and discovery learning can improve learning motivation with effective categories and effectiveness of encyclopedia structure function of plant tissue and discovery learning can improve mastery of concepts with effective categories.

Keywords: discovery learning, encyclopedia, learning motivation, mastery of concepts.

Abstrak: Pengaruh Ensiklopedia dan Discovery Learning terhadap Peningkatan Motivasi Belajar dan Penguasaan Konsep Peserta Didik. Tujuan: Penelitian ini bertujuan untuk mengetahui keefektifan ensiklopedia struktur fungsi jaringan tumbuhan dan discovery learning untuk meningkatkan motivasi belajar dan penguasaan konsep pada peserta didik kelas XI MA. **Metode:** Teknik pengumpulan data motivasi belajar dengan angket dan penguasaan konsep menggunakan tes. Tes dan angket dikumpulkan sebanyak dua kali yaitu pretest dan posttest. Data yang diperoleh dilakukan uji prasyarat analisis dengan uji normalitas dan homogenitas. Selanjutnya dilakukan uji paired t-test dengan bantuan SPSS V.15. **Temuan:** Hasil analisis statistik menunjukkan $P\text{-value} < 0,05$ bahwa ensiklopedia struktur dan fungsi jaringan tumbuhan dan pembelajaran discovery learning efektif meningkatkan motivasi belajar dan meningkatkan penguasaan konsep peserta didik di kelas XI MA. **Kesimpulan:** Efektivitas ensiklopedia struktur fungsi jaringan tumbuhan dan discovery learning dapat meningkatkan motivasi belajar dengan kategori efektif dan efektivitas ensiklopedia struktur fungsi jaringan tumbuhan dan discovery learning dapat meningkatkan penguasaan konsep peserta didik dengan kategori efektif.

Kata kunci: discovery learning, ensiklopedia, motivasi belajar, penguasaan konsep.

To cite this article:

Anggraeni, N. D. S., & Octavia, B. (2023). The Effect of Encyclopedia and Discovery Learning to Improve Learning Motivation and Mastery of Concepts in Student. *Jurnal Pendidikan Progresif*, 13(3), 1354-1365. doi: 10.23960/jpp.v13.i3.202334.

INTRODUCTION

Online learning during the COVID-19 pandemic has become a serious problem that affects students (Teräs et al., 2020). According to Said (2021) that the duration of online learning causes students to get bored because learning is just like a lack of supervision in learning, and sometimes online learning only contains assignments given by educators and then collected after completion through online media. This causes students to experience a decrease in learning motivation. In the era of digitalization, student learning motivation is also a serious problem that we must solve (Yeo et al., 2022). Learning motivation is a factor that also determines the effectiveness of learning (Hanus & Fox, 2015; Chang et al., 2019). Students can learn well if there is a driving factor, namely learning motivation (Chang et al., 2019). Through learning motivation, students have the drive to follow the ongoing learning process (Puspitarini & Hanif, 2019). Students will study seriously if they have high learning motivation (Puspitarini & Hanif, 2019). Learning motivation is all the driving forces within students that cause learning activities that ensure the continuity of learning activities that provide direction to learning activities so that the desired goals of the learning subject can be achieved (Sardiman, 2007). There are two factors that affect learning motivation. According to Budiarti & Siregar (2022) that learning motivation can arise due to internal and external factors. Internal factors that affect learning motivation are: physical factors including nutrition, health, and physical functions (especially the five senses), psychological factors, which are related to aspects that encourage or inhibit learning activities in students. External factors (derived from the environment) that affect learning motivation include: factors nonsocial including air conditions (hot or cold weather), time (morning, afternoon, night), place (quiet, noisy, or quality of school where learning), facilities and

infrastructure or learning facilities, factors social, are human factors (teachers, counselors, and parents).

Regarding with factors aforementioned, the teacher is very role deep in increasing motivation to learn. Therefore, teachers must be able to create interesting and fun learning so that students have high learning motivation (Goddess, 2020; Pangestuti et al., 2019). Teachers expected also to have a choice to gather and make assets learning that pull as wrong one shape Setup Curriculum 2013 (Khusniati & Pamelasari, 2014). Media learning is the wrong one asset Learning that Utilized by Educators when Instruct to push and carry on head tall student deep get Learning (Kotin et al., 2020; Gusti & Shamsurizal, 2021). According to Noviar (2016) that making interesting learning media by teachers is also one the supports to increase learning motivation, one of which is encyclopedias included in variations in the use of media in order to increase learning motivation.

In addition to decreased motivation, observations in library show that there are several encyclopedias but they are limited in number and can only be read in the library. In addition, the topic of the encyclopedia in the library does not yet contain specific topics on the structure and function of plant tissues. Based on the results of the questionnaire analyzing the needs of students distributed, it was found that students had difficulty in understanding biological material, one of which was due to the very broad material, mostly rote memorization, and learning resources that focused on textbooks. The material that students find difficult is the structure and function of plant tissue. Students are also interested in biology learning on the structure and function of plant tissue is presented with pictures rather than just text, and biology learning at the school has never used an encyclopedia. The results of the questionnaire distributed showed the same thing that students were interested in learning plant

structure and tissue material using an encyclopedia.

Encyclopedia is a book that contains a comprehensive and easy-to-understand explanation of all branches of science (Trisnawati et al., 2020). The advantages of developing the encyclopedia developed in this study are that the material and color images presented are sourced from reputable and nationally accredited international journals, and are presented with many images. According to Mulia et al. (2019) state that the encyclopedia used as a learning medium looks interesting because it is packaged more modern with a background that is not monotonous. In addition, the advantages of encyclopedias with a colorful display can provide stimulation for students visually and streamline the course of the learning process.

Another problem is the aspect of mastery of concepts. Mastery of concepts can be interpreted as a result of students' cognitive thinking through activities or learning processes (Widiadnyana et al., 2014; Aini et al., 2018; Gunawan et al., 2021). One indicator of the ability to master concepts is to look at the learning outcomes of students. Mastery of concepts is also a product of a person's learning activities to understand and understand an object through one's observation and experience (Rokhayati, 2011). Learning activities are also required to have an activity that students must do as an effort to improve their mastery of concepts owned by students (Djamarah & Zain, 2006). Efforts have been made to overcome this problem by improving the learning process which can be done using the discovery learning model (Rudibyani, 2019). Discovery learning is learning where students learn to search and find concepts independently (Djamarah & Zain, 2010). The discovery learning model makes students play an active role in the learning process by answering and solving problems to find a concept that can last a long time and be easily remembered

(Martaida et al., 2017; Rudibyani, 2019). This is in line with Suhana (2014) that learning with discovery learning can improve students' ability to find learning problems given by the teacher because this learning emphasizes students to find their own solutions to the problems given by the teacher which will increase student learning activities. Thus, this study aims to the effectiveness of encyclopedia structure function of plant tissue and discovery learning in increasing learning motivation and mastery of concepts in class XI students.

■ METHODS

Participants

The population in this study were students in class XI MA Negeri 1 Tegal for the 2022/2023 academic year. The sample was students of class XI IPA in the odd semester of the 2022/2023 academic year at MA Negeri 1 Tegal aggregate of 60 students. The sampling technique used to determine the experimental and control classes with cluster random sampling is a sampling technique that does not provide equal opportunities for each member of the population to be selected as a sample (Sugiyono, 2013). After obtaining two classes with similar academic abilities, they were then divided randomly as a control or comparison class and an experimental or treatment class.

Research Design and Procedures

Testing encyclopedia products on students with quasi-experimental research is having a control group but not fully controlling outside variables that affect the experimental class. Quasi-experimental research with nonequivalent control group design (Sugiyono, 2013). The test using a quasi-experimental with nonequivalent (pretest-posttest) control group design (Winarni, 2020). There were two groups in this research, namely the experimental group and the control group who received a pretest, treatment, and posttest. The

pretest was given to the experimental class and control class by being given mastery of concept test and learning motivation questionnaire. Treatment in the experimental class using encyclopedia structure and function of plant tissue with discovery learning and control class treatment using commonly used textbooks and PowerPoint. Furthermore, distribute posttest questions mastery of concept, and learning motivation questionnaires. This study was conducted in the odd semester of the 2022/2023 academic year, between October - November 2022.

There are 6 stages of the discovery learning model applied, namely first, providing stimulation by asking questions, allowing students to ask questions, and the teacher responding to questions from students and allowing other students to answer questions. Second, identify problems by giving it a chance for students to identify problems relevant to the structure and function of tissues in plants and the teacher supervised students to be able to formulate hypotheses. Third, data collection by giving it a chance for students to collect various relevant information by reading encyclopedia structure and function of plant tissue and relevant biology books to prove whether the hypothesis is true or not and the teacher supervised students in discussions with their groups. Fourth, data processing by students processing the information they have obtained and together with their group concluding the information. Fifth, verification by inviting group representatives to present the results of the discussion and asking other groups to respond and criticize the results of the discussion submitted by the advanced group. Sixth, generalization namely teacher and student of conclusion together from the activities that have been carried out.

Instrument

The questionnaire is used to get an overview of learning motivation which consists of 6 aspects including desire and fancy to succeed, encouragement and need for learning, 3)

expectation and future aspirations, 4) appreciation for learning, 5) existence of interesting activities in learning, and 6) a conducive learning environment (Nasrah & Muafiah, 2020). Test techniques are used to collect data on mastery of concepts before and after learning with the encyclopedia structure and function of plant tissue and discovery learning. Mastery concepts of students are measured by a test instrument containing question items. The number of questions developed to measure aspects of mastery concept is 15 multiple choice questions which include remembering (C1), understanding (C2), applying (C3), 4) analyzing (C4) (This research is limited to C4). The instruments used have gone through expert judgment. Data collection techniques for learning motivation using questionnaires and mastery of concepts using tests (Bhakti & Astuti, 2018). Tests and questionnaires were collected twice, namely pretest and posttest (Salahuddin et al., 2021).

Data Analysis

The data obtained is quantitative data from the pretest and posttest scores on learning motivation and mastery of concepts obtained by students. The score calculation used the following equation:

$$Value = \frac{Total\ correct\ answer}{Total\ Score} \times 100\%$$

The data obtained were then carried out through prerequisite test analysis with a normality and homogeneity test (Rozal et al., 2021). If the test obtained a value of $P > 0.05$, then continued with the paired t-test ($P\text{-value} < 0.05$) with the help of the SPSS V.15 (Yuneldi et al., 2018; Yuneldi et al., 2021; Aziz, 2022). The effectiveness of the encyclopedia can be seen from the increased learning motivation and concept mastery on each indicator before and after learning using the formula of N-gain:

$$N - gain = \frac{Score\ posttest - Score\ pretest}{Score\ maximum - Score\ pretest}$$

The normalized gain obtained is classified into three categories, namely the gain score obtained is high in the interval >0.7 (effectiveness is in the very effective category). The gain score obtained is in the interval between 0.3 to 0.7 (effectiveness is in the effective category). The gain score obtained is low in the interval <0.3 (effectiveness is in the less effective category) (Putri & Fauzi, 2022).

■ RESULTS AND DISCUSSION

The product developed is encyclopedia structure and function of plant tissues. The encyclopedia developed is presented in printed

form and created using the pages application (Figure 1). The encyclopedia developed is equipped with colorful and clear pictures of plant tissue structures. The material presented is based on reputation international and national accreditation journals. Implementation of encyclopedia structure and function of plant tissue developed in biology learning using the discovery learning model can give students the desire to explore concepts, actively discover concepts, and solve problems. Students explore the material concepts of structure and function of plant tissue through an encyclopedia at the data collection. Furthermore, students actively discover concepts and solve problems in data processing through discussions with their group.



Figure 1. Cover of encyclopedia structure and function of plant tissue

Table 1. The results of the paired t-test on student learning motivation between the treatment class and the control class

Parameters	Class	Testing	Average	P-value (Sig. 2-tailed)
Learning Motivation	Experiment	Pretest	76.2667	0.008
		Posttest	81.4667	
	Control	Pretest	75.5333	0.052
		Posttest	77.4667	

Results of the implementation of encyclopedia structure function of plant tissue and discovery learning to improve learning motivation students are as follows:

Based on statistical results with paired t-tests, the P-value was 0.008 showed a significant difference. These results showed that the encyclopedia structure function of plant tissue and discovery learning can improve the learning motivation of class XI MAN 1 Tegal students proven with a higher posttest score than the pretest score in the experimental class. According to Putri et al. (2017) that the discovery learning model can increase learning motivation in the experimental class compared to the MAN Bondowoso control class. According to Anisa et al. (2017) that discovery learning can increase learning motivation in grade X students of SMAN 16 Bandar Lampung. In addition to the discovery learning model that can increase learning motivation, the fact is that encyclopedia learning media on plant tissue material can increase learning motivation. This statement is in accordance with Faridah (2014) that encyclopedias can increase student learning motivation. According to Rosnawati & Sunaryati (2021) that the development of an encyclopedia based on Wakatobi's local potential with Mollusca material can increase the motivation to learn class students X SMA Negeri 4 Baubau, Southeast Sulawesi.

According to Rosnawati & Kaharudin (2020) that the development of an encyclopedia based on Wakatobi's local potential with the subject matter of invertebrate animals can increase participants learning motivation educated in grade X of SMA Negeri 10 Gowa. The explanation above proves that the discovery learning model and encyclopedia learning media can play a role in increasing learning motivation in grade XI MAN 1 Tegal students. Increased learning motivation is influenced by the discovery learning model which has the advantage that the material or learning materials are not delivered in final form, but students are encouraged to Identify what they want to know followed by finding information on their own and then organizing or shaping what they know and understand in a final form. Another factor that affects learning motivation is that the encyclopedia learning media developed produces clear, colorful printed images and writings that aim to stimulate learning motivation among students of class XI MAN 1 Tegal. The effectiveness of encyclopedia structure function of plant tissue and discovery learning on student learning motivation showed in N-gain value for each aspect of learning motivation (Figure 2). The N-gain of learning motivation in the experimental class is higher than the control class, which shows that learning motivation is in the effective category, especially in aspects 2, 5 and 6.

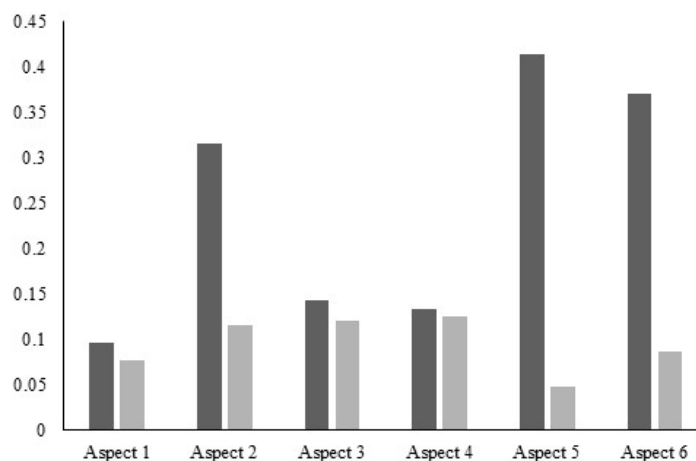


Figure 2. N-gain learning motivations in class experiment and control

Table 2. The results of the paired t-test on students' mastery of concepts between the treatment class and the control class

Parameters	Class	Testing	Average	P-value/ Sig. (2-tailed)
Mastery of concepts	Experiment	Pretest	46.2220	0.000
		Posttest	75.3330	
	Control	Pretest	47.1107	0.057
		Posttest	53.5547	

Results of the implementation of encyclopedia structure function of plant tissue and discovery learning to improve mastery of concepts students are as follows:

Based on the statistical results of the experimental class with paired t-test obtained a P-value was 0.000 showed a significant difference. These results showed that the encyclopedia structure function of plant tissue and discovery learning can increase mastery of the concepts of grade XI MAN 1 Tegal student proven with a higher posttest score than the pretest score in the experimental class. According to Zahara et al. (2020), discovery learning supported by the solar system application can be an alternative learning approach to improve students' ability to master concepts. This is in accordance with Ramadhani & Ratnawulan (2022) that the discovery learning model is more effectively used to improve mastery of concepts. The discovery learning model can improve students' mastery of concepts, especially in the material of Forces and Newton's Laws compared to using conventional learning models (Faradhillah et al., 2021). According to Subramaniam et al. (2022), discovery learning model can improve the mastery of the concept of learning linear motion.

According to Rostikawati et al. (2021) that encyclopedias can increase students' interest in using encyclopedias by 84%, motivation in the learning process by 82%, and understanding of

invertebrate material by 80%. This is following Yunita et al. (2022) that an encyclopedia that contains informative images and information and is easy to understand can increase mastery of concepts. According to Erawati et al. (2020) that the development of encyclopedia learning media with a discovery learning model seen from the implementation in class is categorized very well at meetings one, two, and three. According to Darmaji et al. (2022), the discovery learning model makes students more responsible and has skills in finding, analyzing, and solving problems. As a result, physics learning becomes more meaningful for students and easy to remember every material learned. The explanation above proves that encyclopedia learning media and discovery learning models can improve mastery of the concepts of grade XI MAN 1 Tegal students. Another possibility is because of the compatibility between encyclopedia learning media and discovery learning models that can improve mastery of concepts. The effectiveness of encyclopedia structure and function of plant tissue and discovery learning on mastery of concepts students showed in N-gain value obtained for each indicator of mastery of concepts (Figure 3). The N-gain of mastery of concepts in the experimental class is higher than the control class, which shows that mastery of concepts in the category is effective, especially in indicators C2, C3, and C4.

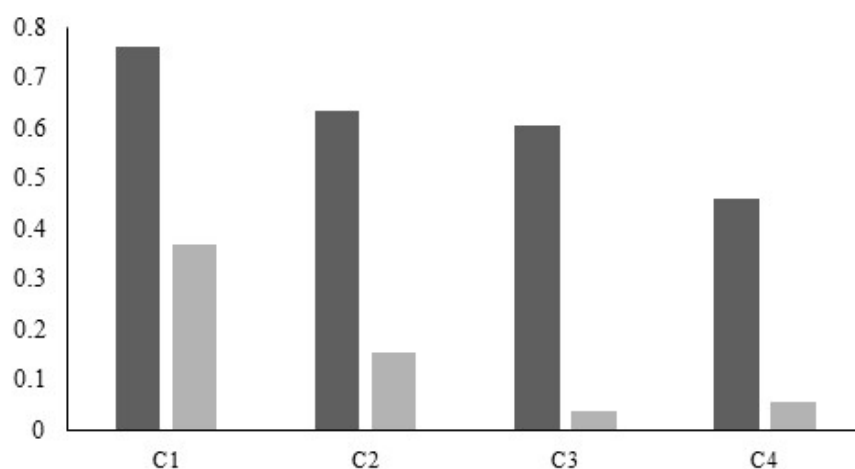


Figure 3. N-Gain mastery of concepts in class experiment and control

CONCLUSIONS

Based on this study, it was concluded the encyclopedia structure function of plant tissue can improve learning motivation because the encyclopedia developed is equipped with colorful and clear pictures of the structure of plant tissue, as well as material presented based on reputation international and nationally accreditation journals. The effectiveness of encyclopedia structure function of plant tissue and discovery learning can improve learning motivation with effective categories. The effectiveness of encyclopedia structure function of plant tissue and discovery learning can improve mastery of concepts with effective categories.

The implementation of the encyclopedia structure function of plant tissue in biology learning and discovery learning model can explore concepts, actively discover concepts, and solve problems to improve mastery of concepts students. This study can enrich learning and improve the quality of learning according to the demands of the curriculum and the development of science. Limitations in this study, namely that the instrument of mastery concepts question developed in this study is limited to mastery of cognitive concepts C1 to C4, for further research it can be developed up to C6.

REFERENCES

- Aini, Z., Ramdani, A., & Raksun, A. (2018). *Perbedaan penguasaan konsep biologi dan kemampuan berpikir kritis siswa kelas X pada penerapan model pembelajaran kooperatif tipe group investigation dan guided inquiry di MAN 1 Praya* [A mastery of biological concept and critical thinking ability differences of grade ten student of man 1 praya on the implementation of cooperative-based learning group investigation type and guided inquiry-based learning]. *Jurnal Pijar Mipa*, 13(1), 19-23.
- Anisa, E. N., Rudibyani, R. B., & Sofya, E. (2017). *Pembelajaran discovery learning untuk meningkatkan motivasi belajar dan penguasaan konsep siswa* [Discovery learning to improve learning motivation and students' concept mastery]. *Jurnal Pendidikan dan Pembelajaran Kimia*, 6(2), 283-295.
- Aziz, A. R. A. (2022). The effectiveness of reality therapy in group counseling to achieve student motivation for academic well-being. *Social Sciences*, 12(8), 886-898.
- Bhakti, Y. B., & Astuti, I. A. D. (2018). The

- influence process of science skill and motivation learning with creativity learn. *Journal of Education and Learning (EduLearn)*, 12(1), 30-35.
- Budiarti, O. P., & Siregar, D. A. (2022). *Pengaruh pembelajaran daring terhadap motivasi belajar siswa kelas X SMA Negeri 1 Delitua TA 2020-2021* [The effect of online learning on learning motivation of class x students of SMA negeri 1 Delitua TA 2020-2021] *AFoSJ-LAS (All Fields of Science Journal Liaison Academia and Society)*, 2(1), 218-225.
- Chang, Y. S., Hu, K. J., Chiang, C. W., & Lugmayr, A. (2019). Applying mobile augmented reality (AR) to teach interior design students in layout plans: evaluation of learning effectiveness based on the ARCS model of learning motivation theory. *Sensors*, 20(1), 1-25.
- Dewi, I. A. C. (2020). *Analisis jenis dan kaidah kebahasaan teks persuasif pada kumpulan motivasi Merry Riana* [Analysis of types and language conditions of persuasive text on Merry Riana's motivational collections]. *Jurnal Ilmu Sosial dan Humaniora*, 9(1), 111-119.
- Darmaji, D., Kurniawan, D. A., Astalini, A., & Sukarni, W. (2022). Description of student responses toward implementation of discovery learning model in physics learning. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 12(1), 1-10.
- Djamarah & Zain, D. (2006). *Strategi belajar mengajar* [Strategies of teaching and learning]. Jakarta: Rineka Cipta.
- Erawati, Y., Raharjo, R., & Azizah, U. (2020). Developing encyclopaedia media on form and function of plant to train elementary students' critical thinking skill. *International Journal for Educational and Vocational Studies*, 2(6), 401-406.
- Faradhillah, F., Marhami, M., & Hardiya, I. (2021). Application of discovery learning models to improve conceptual mastery of Newton force and law. *JIS Edu : Indonesian Journal of Integrated Science Education*, 3(1), 69-77.
- Faridah, L. A. (2014). *Pengembangan ensiklopedia dan lks invertebrata laut untuk pembelajaran biologi* [Development of marine invertebrates encyclopedia and lks for biology learning]. *BioEdu*, 3(3), 580-588.
- Gunawan, G., Kosim, K., Ibrahim, I., Susilawati, S., & Syukur, A. (2021). *The effectiveness of physics learning tools based on discovery model with cognitive conflict approach toward student's conceptual mastery*. Mathematics, Informatics, Science, and Education International Conference (MISEIC), State University of Surabaya, 3 October 2020. Surabaya, Indonesia: Journal of Physics: Conference Series: IOP Science.
- Gusti, U. A., & Syamsurizal, S. (2021). *Uji validitas booklet struktur dan fungsi jaringan tumbuhan untuk peserta didik kelas XI SMA/MA* [Validity test of plant tissue structure and function booklet for students in grade XI senior high school]. *Bioedusiana: Jurnal Pendidikan Biologi*, 6(1), 70-78.
- Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education*, 80, 152-161.
- Khusniati, M., & Pamelasari, S. D. (2014). *Penerapan critical review terhadap buku guru IPA kurikulum 2013 untuk*

- mengembangkan kemampuan mahasiswa dalam menyusun perangkat pembelajaran berpendekatan saintifik [Application of a critical review of the 2013 curriculum science teacher's book to develop students' abilities in preparing learning tools with a scientific approach]. *Jurnal Pendidikan IPA Indonesia*, 3(2), 168-176.
- Kotin, C. D., Bunga, Y. N., & Mansur, S. (2020). *Pengembangan lembar kerja siswa berbasis inkuiri terbimbing untuk siswa SMP negeri nuba arat pada materi kelompok tumbuhan* [Development of guided inquiry-based student worksheets for Nuba Arat State Middle School students on plant group material]. *Spizaetus: Jurnal Biologi dan Pendidikan Biologi*, 1(2): 18-24.
- Martaida, T., Bukit, N., & Ginting, E. M. (2017). The effect of discovery learning model on student's critical thinking and cognitive ability in junior high school. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 7(6), 1-8.
- Mulia, A., Jufri, M., & Syamsiah, S. (2019). *Pengembangan ensiklopedia tumbuhan obat berbasis potensi lokal di daerah sinjai sebagai sumber belajar materi plantae (Spermatophyta)* [Development of an encyclopedia of medicinal plants based on local potential in the Sinjai area as a learning resource for plantae material (Spermatophytes)]. Seminar Nasional Biologi VI, Universitas Negeri Makassar, 29 June 2019. Makassar, Indonesia: Prosiding Seminar Nasional Biologi dan Pembelajarannya.
- Nasrah, N., & Muafiah, A. (2020). *Analisis motivasi belajar dan hasil belajar daring mahasiswa pada masa pandemik Covid-19*. [Analysis of student motivation and online learning outcomes during the covid-19 pandemic]. *JRPD (Jurnal Riset Pendidikan Dasar)*, 3(2), 207-213.
- Noviar, D. (2016). *Jurnal Cakrawala Pendidikan*, 35(2), 198-207.
- Pangestuti, D., Wijayanti, T. A., & Palupi, D. W. (2019). *Pengetahuan pedagogik pada era revolusi 4.0*. Seminar Nasional Pagelaran Pendidikan Dasar Nasional (PPDN) [Pedagogical knowledge in the era of revolution 4.0. National Seminar on National Basic Education Performance (NBEP)]. Universitas Ahmad Dahlan, 30 Juni 2019. Yogyakarta, Indonesia: Prosiding Seminar Nasional Pagelaran Pendidikan Dasar Nasional (PPDN).
- Puspitarini, Y. D., & Hanif, M. (2019). Using learning media to increase learning motivation in elementary school. *Anatolian Journal of Education*, 4(2), 53-60.
- Putri, G. E., & Fauzi, A. (2022). *Efektivitas Penggunaan E-book Fisika Terintegrasi Materi Mitigasi Bencana Petir Berbasis Discovery Learning* [Effectiveness of using integrated physics e-books as lightning disaster mitigation materials based on discovery learning]. *Jurnal Penelitian Pembelajaran Fisika*, 8(2), 161-169.
- Putri, R. H., Lesmono, A. D., & Aristya, P. D. (2017). *Pengaruh model discovery learning terhadap motivasi belajar dan hasil belajar fisika siswa MAN Bondowoso* [The effect of the discovery learning model on learning motivation and physics learning outcomes of Bondowoso MAN students]. *Jurnal Pembelajaran Fisika*, 6(2), 173-180.
- Ramadhani, D. P., & Ratnawulan, R. (2022). The effect of using discovery learning model in high school physics learning: A meta-analysis. *Jurnal Pendidikan Fisika*, 10(2), 93-106.

- Rokhayati, N. (2011). *Peningkatan penguasaan konsep matematika melalui model pembelajaran guided discovery-inquiry pada siswa kelas vii SMPN 1 Sleman* [Increasing mastery of mathematical concepts through the guided discovery-inquiry learning model for class VII students at SMPN 1 Sleman] (Skripsi). Retrieved from http://eprints.uny.ac.id/2102/1/skripsi_Nuri_Rokhayati.pdf
- Rosnawati, V., & Kaharudin, L. O. (2020). *Pengembangan ensiklopedia berbasis potensi lokal yang terdapat di wakatobi pada materi pokok animalia invertebrata (Mollusca dan Echinodermata)* [Development of local potential-based encyclopedia in wakatobi on the main material of animalia invertebrata (Mollusca and Echinodermata)]. *JIKAP PGSD: Jurnal Ilmiah Ilmu Kependidikan*, 4(1), 84-94.
- Rosnawati, V., & Sunaryati, S. (2021). *Pengembangan ensiklopedia berbasis potensi lokal wakatobi pada materi mollusca* [Development of an encyclopedia based on the local potential of Wakatobi on mollusca material]. *Jurnal Pendidikan Tambusai*, 5(3), 6622-6632.
- Rostikawati, R. T., & Susanto, L. H. (2019). *Pengembangan ensiklopedia vertebrata untuk meningkatkan pemahaman konsep biologi siswa SMA* [Development of a vertebrate encyclopedia to improve high school students' understanding of biological concepts]. Seminar Nasional SIMBIOSIS IV, Universitas PGRI Madiun, 15 Agustus 2019. Madiun, Indonesia: Prosiding Seminar Nasional Simbiosis.
- Rozal, E., Ananda, R., Zb, A., Fauziddin, M., & Sulman, F. (2021). The effect of project-based learning through youtube presentations on english learning outcomes in physics. *AL-Ishlah: Jurnal Pendidikan*, 13(3), 1924-1933.
- Rudibyani, R. B. (2019). *Peningkatkan keterampilan berpikir elaborasi dan penguasaan konsep elektrolisis siswa melalui discovery learning* [Improving students' elaboration thinking skills and mastery of electrolysis concepts through discovery learning]. *Jurnal Sains Dan Edukasi Sains*, 2(2), 60-69.
- Sardiman, A. M., Arifin, Z., & Fathoni, T. (2007). *Ilmu pendidikan* [Education science]. Bandung: Remaja Karya.
- Said, M. S. (2021). *Kurangnya motivasi belajar matematika selama pembelajaran daring di MAN 2 Kebumen* [Lack of motivation to learn mathematics during online learning at MAN 2 Kebumen]. *Jurnal Ilmiah Matematika Realistik*, 2(2), 7-11.
- Subramaniam, G., & Sapri, R. (2022). Using discovery learning strategy as a teaching method to enhance conceptual mastery among polytechnic' engineering science students in learning linear motion. *Sosyal Bilimlerde Nicel Araştırmalar Dergisi*, 2(2), 104-114.
- Sugiyono, D. (2022). *Metode penelitian pendidikan: Pendekatan kuantitatif, kualitatif, dan R & D* [Method of educational research : Approaches of quantitative, qualitative, and R&D]. Bandung: Alfabeta.
- Suhana, C. (2014). *Konsep strategi pembelajaran* [Concept of learning strategy]. Bandung: Refika Aditama.
- Teräs, M., Suoranta, J., Teräs, H., & Curcher, M. (2020). Post-Covid-19 education and education technology 'solutionism': A seller's market. *Postdigital Science and Education*, 2(3), 863-878.
- Trisnawati, N. K. A., Pujiati, P., & Sulistyarsi, A.

- (2020). *Penyusunan ensiklopedia berbasis riset pengaruh limbah organik terhadap pertumbuhan jamur tiram (Pleurotus ostreatus) pada materi bioteknologi kelas XII SMA* [Preparation of an encyclopedia based on research on the effect of organic waste on the growth of oyster mushrooms (*Pleurotus ostreatus*) in class XII high school biotechnology material]. Seminar Nasional SIMBIOSIS V, Universitas PGRI Madiun, 28 Oktober 2020. Madiun, Indonesia: Prosiding Seminar Nasional Simbiosis.
- Widiadnyana, I. W., Sadia, I. W., & Suastra, I. W. (2014). *Pengaruh model discovery learning terhadap pemahaman konsep IPA dan sikap ilmiah siswa SMP* [The effect of the discovery learning model on the understanding of science concepts and scientific attitudes of junior high school students]. *Jurnal Pendidikan dan Pembelajaran IPA Indonesia*, 4(2), 1-13.
- Winarni, D. S. (2020). Effectiveness of virtual anatomy system (VAS) media to improve students' analysis ability towards reproduction system materials. *Indonesian Journal of Science and Education*, 4(1), 43-47.
- Yeo, J. H., Cho, I. H., Hwang, G. H., & Yang, H. H. (2022). Impact of gender and prior knowledge on learning performance and motivation in a digital game-based learning biology course. *Educational Technology Research and Development*, 70(3), 989-1008.
- Yuneldi, R. F., Saraswati, T. R., & Yuniwati, E. Y. W. (2018). Profile of SGPT and SGOT on male rats (*Rattus norvegicus*) hyperglycemic after giving Insulin leaf extract (*Tithonia diversifolia*). *Biosaintifika: Journal of Biology & Biology Education*, 10(3), 519-525.
- Yuneldi, R. F., Saraswati, T. R., & Yuniwati, E. Y. W. (2021). The histomorphometry of liver and kidney of hyperglycemic albino rats after treatment with *Tithonia diversifolia* leaf extract. *Biosaintifika: Journal of Biology & Biology Education*, 13(2), 135-141.
- Yunita, S., Wulandari, S., & Suzanti, F. (2022). Development of an electronic encyclopedia of spermatophyta sub materials based on flipbook maker for class X high school students. *Journal of Educational Sciences*, 6(3), 341-352.
- Zahara, A., Feranie, S., Winarno, N., & Siswantoro, N. (2020). Discovery learning with the solar system scope application to enhance learning in middle school students. *Journal of Science Learning*, 3(3), 174-184.