Vol. X No. 2 December 2024
DOI: https://doi.org/10.19109/bioilmi.v10i2.23579
E-ISSN: 2527-3760
Page: 124 - 132

Study to Analyze the Effectiveness of Discovery Learning Model in Biology Learning

Fitry Della Andriani, Renisa Abdullah, Hendra Eka Saputra, Lely Mardiyanti*, Jodion Siburian, Ali Sadikin

Biology Education, Mathematics and Science Education, Faculty of Teacher Training and Education, Universitas Jambi

**lelymardiyanti@unja.ac.id* *(Corresponding Author)*

ARTICLE INFO

***Article history*:**
Received: 21/06/2024
Revised: 10/12/2024
Accepted: 27/12/2024

***Keywords*:**
Critical Thinking
Discovery Learning
Learning Outcomes
Collaboration
Motivation

ABSTRACT

In teaching and learning activities on biology materials, educators are often faced with challenges to the ability of students to understand deep biological concepts. An innovation that is needed by educators is the determination of a learning model that adapts to students. The purpose of the research in this article is a rigorous and regular review of the effectiveness of the discovery learning model in learning biology. Literature review is a method used in this article research which is carried out by identifying, analyzing, describing, and making conclusions based on the relevance of the selected research results systematically. The results of the review of 10 articles show that learning biology using the discovery learning model can improve the ability to collaborate, and creative and critical thinking of students as well as the activeness and learning outcomes of students. Based on the results of the research, the use of the discovery learning model is very effective in the biology learning process in that it can improve students' learning outcomes, and critical thinking skills and increase students' motivation to learn.

INTRODUCTION

Biology learning is often faced with challenges in developing a deep understanding of concepts. This is often associated with conventional teaching methods that tend to be passive, such as lectures and memorization. These methods are often less effective in generating learner engagement and facilitating understanding of biological concepts in the learning process. Learners do not get the opportunity to be active in the process of teaching and learning activities because of this lecture method. One of the solutions to improving the effectiveness of biology learning is through the application of diverse and varied learning models through exploration activities.

Exploration activities allow students to learn actively by observing, experimenting, and analyzing natural phenomena directly around our environment. According to Basaroh et al., (2021) stated that learning biology requires an approach process using exploration space so that it can find concepts through experimental learning. Through this approach, students not only memorize material but can also develop essential 21st century skills in understanding biological material holistically. By involving learners in exploratory activities, teachers can help learners construct their knowledge and relate it to real experiences. This is important because biology is a science that is closely related to everyday life and the surrounding environment. In addition, exploratory activities can increase students learning motivation by providing a more interesting and relevant learning experience. One of the learning components that can support the effectiveness of the biology learning process is the discovery learning model.

The discovery learning model is one of several learning models recommended by Permendikbud No. 103 of 2014 in the 2013 curriculum. Discovery learning is an active and direct learning style developed by Jerome Bruner in the 1960s. This discovery learning model, in its

learning, makes students the center of learning, namely by making these students have a sense of desire to seek and find their knowledge concepts so that these students will play an active role in ongoing learning (Neno et al., 2022). The discovery learning model is a process of learning activities that include the activeness of students, students who can analyze and solve problems in the learning process. So, discovery learning is a learning model that makes students the center of learning where students are required to be able to find a concept by understanding the material, analyzing a problem, and presenting it in learning.

Learners can also learn to think analytically and solve problems through discovery learning. Discovery learning also allows learners to discover ideas through examples of everyday life. Discovery learning can also improve learners' communication skills and learning outcomes. Therefore, discovery learning is a useful learning model to help learners improve their ability to solve problems, metacognition, be able to think analytically, develop learners creativity, and carry out good communication with other learners and educators.

Based on the explanation, it is necessary to prove scientifically that the discovery learning model affects the improvement of students' learning outcomes, critical thinking skills, and increased motivation of students in learning by using several existing studies and identifying shortcomings in the discovery learning model. This is also in line with the statement from Gough et al., in Zawacki-Richter et al., (2020) which states that a literature review can be interpreted as a re-examination of existing or used research and is carried out carefully and systematically. So that the results of the literature review can answer the questions in this research (Research Question). This literature review uses several research articles related to the discovery learning model as a source of research that is relevant to the topic.

In previous research, it was discovered that the Discovery learning learning model allows students to find ideas, learn to think critically and solve problems. Apart from that, this Discovery learning learning model can also influence student learning outcomes, increasing students' learning motivation. Neno et al., (2022) also stated that to improve learning outcomes and learning motivation, students can use the Discovery learning learning model by focusing on the students themselves. The active role of students is really needed in order to get an increase in learning outcomes and students' learning motivation. In this article, researchers analyze, review and examine several other articles related to the Discovery learning learning model. From this article, it can be seen that whether or not the use of the Discovery learning learning model is correct can improve student learning outcomes.

MATERIALS AND METHODS

1. Time and Place of Research

This research was conducted in April 2024 at Jambi University. The place of research is not limited to a specific physical location because the data used in this analytical study is collected from search engines such as google scholar, science direct and connected papers.

2. Types of Research

This research is descriptive qualitative, with the aim of the effectiveness of the Discovery Learning learning model in learning Biology. with a research focus on describing the effect of the Discovery Learning learning model on learning outcomes, learning motivation, critical thinking skills, collaboration skills and student activeness in learning Biology.

3. Research Methods

This research was conducted using the Literature review method through the process of identifying, analyzing, describing and concluding based on the relevance of the selected research results systematically. Literature review or literature review is an analysis of a problem through various relevant research sources by describing, evaluating and clarifying knowledge that is already known in a subject area (Gani et al., 2020). In this Literatue review also uses secondary data, which means that existing data is obtained through previous research.

4. Population and Sample

The population of this study includes all published articles on the use of learning models in biology learning. The sample was selected purposively, namely articles published in

international and national journals in 2021-2024 indexed by Sinta 4 to 5 and indexed by Scopus with a Quartile 1 (Q1) ranking. With the sampling technique using simple random sampling technique, there were 10 literatures.

5. Research Procedure

This research uses a procedure that goes through several stages. The stages of the research procedure are presented in the figure below.

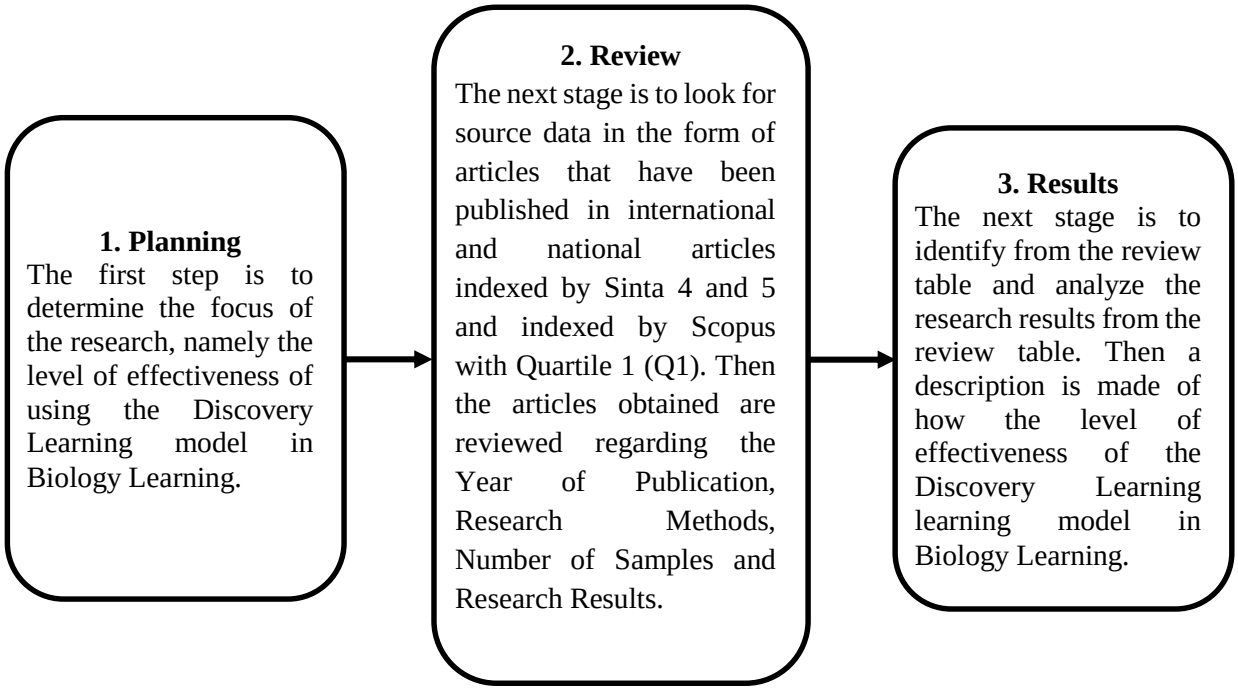

Figure 1. The stages of this research.

6. Data Collection

The data in this study were collected through search engines such as google scholar, science direct, and connected papers.

7. Data Analysis

The data collected was analyzed qualitatively by identifying and reviewing the Year of Publication, Research Methods, Number of samples and Research Results on the research article findings data. This analysis will help get the results that will be displayed in the review table which will show the effect of the Discovery Learning model in Biology Learning.

The results of data analysis displayed in the table will be identified, analyzed, described, and made conclusions that will get a description of the level of effectiveness of the Discovery Learning learning model in Biology Learning. This research uses the description method for data analysis.

RESULTS AND DISCUSSION

This study produces a description and overview of various literature obtained from Google Scholar, Science Direct, and connected papers related to the application of the discovery learning model in biology learning. Based on the search conducted, 40 pieces of literature related to the research subject taken by the researcher were obtained, and as many as 10 pieces of literature as the main literature, the review results are presented in Table 1.

Table 1. Literature Review Results.

Code, Author	Year/ Sinta	Method	Number of Samples	Data Analysis Techniques	Results
A1. Abdul, D.	2022/4	Classroom Action Research (CAR), 2 cycles	20 Students	Descriptive Quantitative	The results of the study show that students' biology learning outcomes can be significantly improved with the discovery learning model. Learning.
A2. Nisa., et al.	2020/5	PTK, 2 cycles	23 Students	Descriptive Quantitative and Qualitative	The research results show that applying the discovery model learning is very helpful in teachers' efforts to improve students' creative thinking skills and learning outcomes.
A3. Anisha.	2021/4	Quasi Experiment	100 Students	Descriptive and Inferential Statistics	The results of this study indicate that there is a positive influence on the application of the discovery learning model. Learning on the learning outcomes of biology material for students on fungi in the classroom.
A4. Grace., et al.	2024/4	PTK, 2 cycles	38 Students	Qualitative Descriptive	discovery model learning in Biology learning can improve students' collaboration skills.
A5. Abijah.	2023/4	PTK, 2 cycles	21 Students	Qualitative Descriptive	By implementing the discovery learning model this learning can improve the learning outcomes of class X IPA students at Ternate City State Senior High School.
A6. Nurrahmayani & Yusni.	2024/5	PTK 2 cycles	32 Students	Qualitative Descriptive	Learning with the discovery model this learning is quite effective because some students can understand and receive the learning well.
A7. Wiraguna & Wayan.	2023/5	PTK 2 cycles	45 Students	Descriptive Statistics	Learning outcomes in the application of the discovery model learning at SMA Negeri 1 Kuta Utara was seen to have increased from cycle I at 70, to cycle II at 87 with a very good category.
A8. Gulo.	2022/4	PTK 2 cycles	16 Students	Qualitative Descriptive	Student learning outcomes increased from cycle I to cycle II.
A9. Pradnyani & Juwana.	2023/5	PTK 2 cycles	34 Students	Questionnaire	There was an increase in students' learning motivation between cycle I and cycle II with a good motivation category, namely a value above 70.
A10. Aldalur & Perez.	2023/ Scopus Index /Q1	Quasi Experiment	41 Students	Descriptive Statistics	The use of a combination of gamification and discovery learning in learning has improved students' academic results and increased students' motivation.

Based on the 10 articles that have been reviewed, 8 articles use the Classroom Action Research (PTK) method, and 2 articles use the Quasi-Experiment method. Where the Classroom Action Research (PTK) method is carried out through 4 stages. These stages include planning, implementation, observation, and reflection (Arrahmah et al., 2024).

This classroom action research was carried out in more than 1 cycle, in the articles that have been reviewed almost entirely using 2 cycles. Articles that use this quasi-method are a research method that involves manipulating independent variables, controlling extraneous variables, and also

measuring the effects of independent variables on dependent variables (Hastjarjo, 2019). Quasi-experiment itself is defined as an experiment in which there is treatment, measurement of impact, and experimental units (Abraham & Supriyati, 2022).

The implementation of II cycles in the reviewed article using the class action research method is because in cycle I the results have not shown changes in obtaining the success indicators that have been determined in advance. Therefore, improvement efforts were made in cycle 2 by reflecting optimally on the implementation of the discovery learning model in the learning process. In the learning process of cycle II, students are guided to try to maximize learning outcomes and get optimal completeness on biology material. In the implementation of learning using the discovery learning model, educators provide independence for students to gain and manage their knowledge, therefore the learning process is more meaningful for students (Abdjul et al., 2022).

In the learning process, educators need strategies that can maximize the cognitive skills of students. One of the strategies that can be attempted by educators is by applying the discovery learning model. The learning process with the discovery learning model can optimize critical thinking skills and student learning outcomes (Prasasti et al., 2019; Mardiyanti, 2023). Therefore, discovery learning plays an effective role in learning that improves students' critical thinking skills. For example, where learners are required to learn actively in the learning process. Learners can encounter various problems and try to solve problems during the learning process (Haeruman et al., 2017). In applying the discovery learning model, students are expected to be able to optimize critical thinking skills. In addition, in the learning model, students are involved during the learning process so that students feel happy and not bored during the learning process. This follows the research of Fadlina et al., (2021) which explains that the application of the STEM-based discovery learning model can optimize critical thinking skills because students are trained to ask and answer to obtain the actual arrival of a problem determined to solve the problem (Ujud et al., 2023; Larasati, 2019; Nurhidayah et al., 2023; Wanti & Yerimadesi, 2019).

The use of other learning models such as the lecture method, has disadvantages where students are unable to understand the material that has been delivered and also students are very easy to feel bored when learning takes place. This is supported by research from Gulo (2022) at SMA Negeri 1 Lolowau, which before the application of the discovery learning model in learning, some students were still minimally active so that students were less enthusiastic in the ongoing learning process. The learning used also still uses a teacher-centered learning model, so that students are less active and listen more to the teacher lecturing rather than learning independently, for example, such as finding out information related to learning material. To overcome these problems, a discovery learning model was applied to SMA Negeri 1 Lolowau students. The results were 14 students out of a total of 16 students in the class had a significant increase in their learning outcomes. In the research of Sukardi et al. (2015) stated that learning by using the discovery learning method in the experimental class had a positive effect and a great opportunity in the ease of students to understand and remember the material. This learning method is very suitable to be applied, so that students are eager to learn and do not cause boredom during the teaching and learning process. The increase in learning outcomes is also supported by research from Dwi & Rahayu (2017) which states that success in the learning process depends on the value of student learning outcomes. The use of this discovery learning model has the aim that students are able to be actively involved in learning and it is hoped that students will be able to form effective cooperation with other students, share information and listen to other people's ideas (Hosnan, 2014; Izetbigovic et al., 2019; Miterianifa et al., 2023; Sunarto & Amalia, 2022).

Biology learning activities generally require an exploration activity. Where exploration activities require more than 1 person to gain new experiences and knowledge. Collaboration skills are needed in working together in exploration activities. In the learning process, the learning model that can be applied to improve collaboration skills is the discovery learning model. This is following the results of research by Rahayu et al., (2024) which says that the discovery learning model applied to biology learning can improve students' collaboration skills, this can be proven by an increase in collaboration skills in cycle I to cycle II in the study. This is also supported by research from

Hartadiyati et al., (2023) which reveals that the discovery learning model can optimize students' motivation and collaboration skills which are shown in that students are already active in the process of understanding learning material, namely fungi material. Where students have the motivation to learn, thus supporting the collaboration that occurs in students with other students, where students apply this collaboration in the exploration and group discussion space to solve a problem (Ali & Setiani, 2018).

In the learning process, students are expected to have learning motivation so that the achievement of a learning goal can be achieved during the learning process (Prayogi et al., 2023). According to Kusnandar (2019), the existence of learning motivation in students is needed, because it is needed so that the learning process in the classroom can run well and achieve the learning objectives themselves. This is also comparable to research from Aldalur et al., (2023) where the use of the discovery learning model can increase learning motivation in a student which can be seen from the value of the student's learning outcomes, this is shown in the increase in the value of student learning outcomes by 0.84 points compared to the previous school year. This means that the number of failures in the learning process is reduced by 15.55% through this discovery learning model. The application of this discovery learning model can increase students learning motivation and the existence of learning motivation will affect the achievement of learning completeness from students (Jannah et al., 2022; Prayogi et al., 2023; Dewi et al., 2023).

Students' learning motivation can be improved through the discovery learning process. The discovery learning model can be combined with gamification. Gamification is a strategy that can turn learning into an immersive activity. The combination of discovery learning with gamification will be very favored by students who are less able to understand learning with the lecture method. So that the feeling of pleasure and enthusiasm from students will trigger their desire or motivation to learn. This is also in line with research from Aldalur & Perez (2023), which states that discovery learning combined with gamification can be a means of introducing students to theoretical learning in a fun way, namely through gamification so that students will feel motivated to learn. Theoretical learning itself is monotonous and difficult to understand if there is no direct learning using media. So gamification can be combined with the discovery learning model by readjusting the type of gamification used according to the teaching material (Sugiyanto, 2023).

CONCLUSION

The use of the discovery learning model is very effective to be used to improving students' learning outcomes, and critical thinking skills and increasing students' motivation to learn. The advantages of the discovery learning model are that students can be active in the classroom, and the discovery learning model will train students to think critically in analyzing, trying, and solving a problem independently. The disadvantage of the discovery learning model is that it requires a lot of time to adapt from the previous learning model to the discovery learning model.

ACKNOWLEDGEMENTS

The author would like to thank those who have helped the author in the preparation of this article. To previous researchers who have assisted in the preparation of this article and to other parties who have contributed to the preparation of this article.

REFERENCES

Abdjul, D. (2022). Penerapan Model Pembelajaran *Discovery learning* Untuk Meningkatkan Hasil Belajar Biologi Pada Peserta didik Kelas X SMA Negeri 1 Buntulia. *Jurnal Aksara*, 8 (1): 343-348.

Abija, N., Madjid, I., & Papuangan, N. (2023). Model *Discovery learning* Untuk Meningkatkan Hasil Belajar Peserta didik Kelas X SMA Negeri 6 Kota Ternate. *Jurnal Bioedukasi*. 6(1): 251-256.

Abraham, I. & Supriyati, Y. (2022). Desain Kuasi Eksperimen dalam Pendidikan: *Literature Review*. *Jurnal Ilmiah Mandala Education*. 8(3): 2476-2482.

Ariana, D. Situmorang, R. P. & Krave, A. S. (2020). Penerapan Model Pembelajaran *Discovery learning* Berbasis Proyek untuk Meningkatkan Hasil Belajar dan Keterampilan Berpikir Kreatif Peserta Didik SMA pada Materi Sistem Pencernaan Manusia. *Jurnal Pendidikan Biologi*. 22(3): 425-434.

Arrahmah, J., Kusuma, Y., & Fadhilaturrahmi. (2024). Peningkatan Kemandirian Belajar Peserta didik dengan Menggunakan Model Pembelajaran *Discovery Learning* di Sekolah. *Journal of Education Research*. 5(2): 1105-1117.

Aldalur, M. L., & Perez, E. J. (2023). *Discovery Learning in Science Education*: *A Systematic Review of Research*. *Journal of Research in Science Teaching*. 60(1): 1-31.

Ali, M. & Setiani, D. D. (2018). Pengaruh Model *Discovery Learning* Terhadap Hasil Belajar Peserta Didik pada Konsep Fungi. *Jurnal Bioedusiana*. 3(2): 60-61.

Anisa, N., Anisa., & Irmawanty. (2021). Pengaruh Model Pembelajaran *Discovery learning* Terhadap Hasil Belajar Biologi Materi Fungi. *Jurnal Binomial*, 4(1): 26-35.

Basaroh, A., Muhdhar, I., Prasetyo, T. I., Sumberartha, I. W., Mardiyanti, L., & Fanani, Z. (2021). Pengembangan E-Modul Model Eksperiental Jelajah Alam Sekitar (Ejas) Pada Materi Plantae. *Jurnal Pendidikan Biologi*, 12(1), 30-39.

Dwi, F.K., & Rahayu. (2017). Pengaruh Model Pembelajaran *Discovery learning* Terhadap Hasil Belajar Peserta didik. *Jurnal Scholaria*, 6(2), 130-139.

Dewi, A. P., Muhiddin, N. H., Halim, M. H., & Hamid, A. A. (2023). Upaya Peningkatkan Motivasi Belajar IPA melalui Strategi Pembelajaran Aktif Berbasis Model *Discovery learning* SMP Negeri 1 Tomoni. *Jurnal Pemikiran dan Pengembangan Pembelajaran*. 5(2): 863-872.

Fadlina, Artika, W., Khairil., Nurmaliah, C., & Abdullah. (2021). Penerapan Model *Discovery learning* Berbasis STEM pada Materi Sistem Gerak Untuk Meningkatkan Keterampilan Berpikir Kritis. *Jurnal Pendidikan Sains Indonesia*, 9(1), 99-107.

Febrianda, L. & Ardi. (2024). Meta-Analisis: Validitas Dan Praktikalitas Modul Berbasis *Discovery learning*. *Jurnal Pendidikan Tambusai*, 9(1): 8008-8017.

Gani, A. R. F., Zaimah, U., & Wulandari, S. R. (2020). Studi Literatur Upaya Meningkatkan Literasi Informasi Siswa Pada Mata Pelajaran Biologi Selama Belajar Daring Efek Covid-19. *Bioilmi: Jurnal Pendidikan*, 6(2), 129–136.

Gulo., & Adenirwati. (2022). Penerapan Model *Discovery learning* Terhadap Hasil Belajar Peserta Didik Pada Materi Ekosistem. *Educativo : Jurnal Pendidikan*, 1(1), 307-313.

Haeruman, A., Djepy, A. N., Tolangara, A. Nur, T. D. (2017). Pengaruh Model Pembelajaran *Discovery learning* Berbasis Sains Edukasi terhadap Hasil Belajar dan Keterampilan Berpikir Kritis Peserta didik SMA pada Materi Fotosintesis. *Jurnal Bioedukasi*, 9(1), 1-10.

Hamalik., & Oemar. (2017). *Proses Belajar Mengajar*. Jakarta: PT Bumi Aksara.

Harahap, N., Nursamsu., & Styoko. (2023). Pengembangan Modul Biologi Berbasis Guided Discovery Learning pada Kelas VII SMPN 13 Langsa. *Bioilmi: Jurnal Pendidikan*, 9(2): 1-12.

Hastjarjo, T. D. (2019). *Rancangan Eksperimen-Kuasi*. Buletin Psikologi. 27(2): 187-203.

Inde, K. H., Kaleka, M. B. U., & Ilyas, I. (2020). The Effect of *Discovery learning* Model on Learning Outcome of Grade-Vii Students of SMPN 5 Nangapanda. *Journal of Science Education Research*, 4(1), 11–14.

Istarani. (2014). Pemanfaatan Model *Discovery learning* Melalui Laboratorium Virtual Untuk Meningkatkan Keterampilan Proses Sains dan Hasil Belajar Peserta didik SMA Kelas X Pada Materi Sistem Pencernaan Manusia. *Jurnal Pendidikan IPA*, 1(1), 1-10.

Izetbigovic, M. A. Solfarina. Langitasari, I. (2019). Penerapan Model *Discovery learning* Untuk Meningkatkan Keterampilan Generik Sains Peserta didik. *Jurnal Kimia Dan Pendidikan*. 4(2): 164-170.

Jannah, U. S. M., Hadiprasetyo, K. Harsan, T. (2022). Peningkatan Motivasi Belajar Ilmu Pengetahuan Alam Melalui Model *Discovery learning*. *Journal of Education Research*. 4(3): 39-46.

Josephine, A. K. Sawiji, H. & Susantiningrum. (2016). Penerapan Model Pembelajaran *Discovery learning* Untuk Meningkatkan Keaktifan Dan Prestasi Belajar Peserta Didik Pada Mata Pelajaran Pengantar Administrasi Perkantoran Kelas X Administrasi Perkantoran 3 SMK Negeri 6 Surakarta. *Jurnal Informasi Dan Komunikasi Administrasi Perkantoran*. 1(1): 14-17.

Kumalasari, D., Sudarti., & Lesmono, A.D. (2015). Dampak Model *Discovery learning* Terhadap Keterampilan Proses Sains Dan Hasil Belajar Ipa-Fisika Peserta didik Di MTS Negeri 1 Jember. *Jurnal Pendidikan Fisika,* 2(1), 80-86.

Larasati, Diyas Age. (2019). Pengaruh Model *Discovery learning* Berbasis Higher Order Thinking Skill Terhadap Kemampuan Berpikir Kritis. *Jurnal Ilmiah Ilmu Pendidikan*. 11(1): 39-47.

Mardiyanti, L. (2023). Pengaruh Model Discovery Learning Dipadu Lesson Study terhadap Hasil Belajar Mahasiswa Pendidikan Biologi: (The Effect of Discovery Learning Model Combined with Lesson Study on Learning Outcomes of Biology Education Students). *BIODIK*, 9(3), 71-77.

Miterianifa. Athifah, N., Leani, J. Okmarisa, H. (2023). *Pengaruh Model Pembelajaran Kimia Terhadap Pemahaman Peserta didik Di SMA.* Prosiding Seminar Nasional OPPSI. 1(2): 87-90.

Mukti, Y. P., Masykuri, M., Sunarno, W., Rosyida, U. N., Jamain, Z., & Dananjoyo, M. D. (2020). Exploring the Impact of Project-Based Learning and *Discovery learning* to The Students' Learning Outcomes: Reviewed from The Analytical Skills. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 9(1), 121–131.

Muhdhar, M. H. I. Al, Aini, N., Rohman, F., Sumberartha, I. W., Mardiyanti, L., & Wardhani, W. (2021). *Improvement of collaboration skills and environmental literacy through the surrounding nature exploration integrated group investigation.* AIP Conference Proceedings, 2330.

Neno, M., Dharma, M., Krisna., & Dewi, P. A. (2022). Analisis Literature Review Penerapan Model *Discovery learning* Pada pembelajaran IPA Di Sekolah Dasar. *Jurnal Metamorfosa,* 11(1): 20-33.

Nisa, I., Ma'arif, L, B., Meishanti, O. P. Y. (2020). *Discovery Learning* Untuk Meningkatkan Kemampuan Berpikir Kreatif Dan Hasil Belajar Siswa Pada Konsep Keanekaragaman Hayati. *Jurnal Eduscope.* 5(2): 3-9.

Nurrahmayani., & Yusni. (2024). Penerapan Model Pembelajaran *Discovery learning* Dalam Meningkatkan Hasil Belajar Peserta didik. *Journal On Education*. 6(2): 14180-14186.

Nurhidayah, F. Sugandi, A.I, Kadarisma,G. (2023). Systematic Literature Review: Pengembangan Kemampuan Berpikir Kritis Peserta didik Melalui Pembelajaran *Discovery learning*. *Jurnal Pembelajaran Matematika Inovatif.* 6(5): 2075-2081.

Prasasti, D., Nurjanah, R. R., Rinanto, Y., Prayitno, B. A. (2019). Pengaruh Model Pembelajaran *Discovery learning* Berbasis Sains Edukasi terhadap Hasil Belajar dan Keterampilan Berpikir Kritis Peserta didik SMA pada Materi Fotosintesis. *Jurnal Bioedukasi*, 11(2), 247-256.

Pradnyani, N. K. Y., & Juwana, I. D. P. (2023). Penerapan Model Pembelajaran *Discovery learning* Untuk Meningkatkan Motivasi Belajar Biologi Peserta didik Pada Materi Sistem Respirasi Kelas XI MIPA 2 SMA Negeri 11 Denpasar Tahun Pelajaran 2022/2023. *Jurnal Edukasi Matematika dan Sains,* 12(2): 1-13.

Prayogi, D., Widyangrum, H. Widowati, A. (2023). Implementasi Model Pembelajaran *Discovery learning* Guna Meningkatkan Motivasi Belajar IPA Peserta Didik Kelas VII SMP. *Pancasakti Science Education Journal.* 8(2): 41-48.

Rahayu, F., Sumardi, L., & Jamaluddin. (2024). Meningkatkan Keterampilan Kolaborasi Peserta Didik Melalui Penerapan Model *Discovery learning* Pada Pembelajaran Biologi Di SMAN 5 Mataram. *Jurnal Kependidikan,* 9(1): 1-6.

Rustaman, N.Y. (2017). *Mewujudkan Sistem Pembelajaran Sains / Biologi Berorientasi Pengembangan Literasi Peserta Didik, Mewujudkan Sistem Pembelajaran KS-2*. April, 1-8.

Setyaningrum, W., Riani, A. L., & Wardani, D. K. (2020). Comparison of Problem-Based Learning and *Discovery learning* Model. *International Journal of Multicultural and Multireligious Understanding*, 7(3), 305–313.

Sukardi, I., Wigati, I. & Masripah, I. (2015). Pengaruh Metode Pembelajaran Discovery Learning Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Biologi Kelas VII di MTs Patra Mandiri Plaju Palembang. *Bioilmi: Jurnal Pendidikan*, 1(1): 22-29.

Sunarto, M. F. & Amalia, N. (2022). Penggunaan Model *Discovery learning* Guna Menciptakan Kemandirian Dan Kreativitas Peserta Didik. *Jurnal Pendidikan Bahasa Dan Sastra*. 21(1): 94-96.

Sugiyanto, Z. N. (2023). *Pengaruh Pembelajaran Integrasi Discovery Learning Dengan Numbered Head Together Berbantu Gamifikasi Terhadap Pemahaman Konsep Siswa Pada Materi Sistem Reproduksi.* Surakarta: Universitas Sebelas Maret.

Ujud. S., Nur. T. D., Yusuf, Y., Saibi, N., Ramli. M. R. (2023). Penerapan Model Pembelajaran *Discovery learning* Di SMAN 10 Kota Ternate Pada Materi Pencemaran Lingkungan. *Jurnal Bioedukasi*. 6(2): 337-346.

Wati, Y., & Sartiman, S. (2019). *Discovery learning*: Pengaruhnya Terhadap Hasil Belajar. *Indonesian Journal of Science and Mathematics Education*, 2(1), 123–129.

Wanti. R & Yerimadesi. 2019. Pengembangan Modul Reaksi Reduksi dan Oksidasi Berbasis Guided *Discovery learning* Untuk Kelas X SMA. *Jurnal Edukimia*. 1(2): 38-43.

Widyastuti, S. E. (2014). *Penerapan Model Pembelajaran Discovery learning Pada Materi Konsep Ilmu Ekonomi.* Prosiding Seminar Nasional, 33–40.

Widiadnyana, I.W., Sadia, I., & Suastra, I. (2014). Pengaruh Model *Discovery learning* Terhadap Pemaham Konsep IPA dan Sikap Ilmiah Peserta didik. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, 4(2): 1-13.

Wiraguna, I. P. A., & Sudiarsa, I. W. (2023). Penerapan Model *Discovery learning* Dalam Pembelajaran Biologi Materi Sistem Ekskresi Untuk Meningkatkan Aktivitas Dan Hasil Belajar Peserta didik Kelas IX SMA Negeri 1 Kuta Utara. *Jurnal Edukasi Matematika dan Sain*s, 12(2): 134-139.

Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., & Buntins, K. (2020). Systematic reviews in educational research: Methodology, perspectives and application (p. 161). Springer Nature.