JISE 9 (1) 2020 : 19 - 27

Journal of Innovative Science Education

http://journal.unnes.ac.id/sju/index.php/jise

Development of Learning Modules Discovery Learning Models Based on Results of Plant Identification in School Environments

Aida Shofiyati [1]✉, Amin Retnoningsih [2], Saiful Ridlo [3]

[1] Bangsri 1 Public High School, Jepara, Indonesia
[2] Universitas Negeri Semarang, Indonesia

Article Info

Article History :
Received May 2019
Accepted June 2019
Published April 2020

Keywords:
Learning Module, Discovery Learning, Plant Identification, School Environment

Abstract

The school environment has potential as a learning resource for developing contextual teaching materials. The purpose of this study is to test the validity and effectiveness of the module learning Discovery Learning model based on identification of plant in SMAN 1 Bangsri, Jepara, Central Java. This research is a development research consist of plants identification and module development. The plants identification refer to internet and book. Module development refers to Sugiyono's model and its validity assessed by 4 validators. The effectiveness of module tested by pretest-posttest control group design. The sample class taken by cluster random sampling technique, 1 experiment class and 1 control class. There are 147 species plant in SMAN 1 Bangsri, they are member of divisio Bryophyta, Pteridophyta, and Spermatophyta. The content of module is a valid, presentation and graphics, and language are a very valid. The result of cognitive test significantly different between control and experiment class. The affective value which very good predicate in the experiment class higher than the control class, while the psychomotor value only a slight difference. The results of validity test and effectiveness of module Discovery Learning model based on the results of plants identification are feasible as teaching materials.

✉ correspondence :
Jl. Jerukwangi, Bangsri, Krajan, Jerukwangi, Jepara, Jawa Tengah, Indonesia 59453
E-mail: aidashofiyati@gmail.com

p-ISSN 2252-6412
e-ISSN 2502-4523

INTRODUCTION

Characteristics of plants and their role in life is one of the scopes of high school biology subjects. Plant material is quite difficult, it's showed from the results of observations in SMAN 1 Bangsri, SMAN 1 Mlonggo and SMAN 1 Jepara Central Java. Classical completeness results of daily tests of class X plant material are below 70%. The students must learn the characteristics, structure, method of breeding and classification of plants, and their role for life are considered difficult (Zarisma et al., 2016). In addition, the difficulty of students studying plant material is due to the large diversity of plants, concepts and scientific terms (Guntur et al., 2014). Cimer (2012) also added that the teaching methods also influence students' ability to understand material, even according to Marisa et al. (2016) the teaching method is the most influential factor on the difficulties faced by students. In general, the learning process does not involve practical activities, both observation activities in the field and in the laboratory, and not related to daily life. This can be caused by a lack of knowledge and ability to teach teachers on a topic (Cimer, 2012). The teacher is also required to be able to choose the right textbook because biology textbooks contain false information sometimes and only encourage students to memorize so that it needs to be revised (Çobanoğlu & Şahin, 2009).

Various efforts should be made by the teacher to overcome the difficulties of students in learning plant, namely the application of learning models, learning resources and appropriate teaching. The learning model of Discovery Learning (DL) is one model that can encourage students to be able to identify, find information and organize concepts that they want to know (Kemendikbud, 2014). DL implementation has been shown to improve learning outcomes (Sukardi et al., 2015; Astuti et al., 2018). The use of school environment as a learning resource provides opportunities for students to learn, to find and gain direct experience, so that learning is more interesting and enjoy (Istiani & Retnoningsih, 2015; Safitri et al., 2014; Syamsudduha & Rapi, 2012). Teaching materials should be in accordance with the need to overcome student difficulties in understanding plant. The breadth of coverage of plant material requires a large allocation of learning time. Therefore, its need teaching materials for students to study independently. Teaching material that can increase student ability to learn independently is a module. The use of modules in learning train students to learn independently and the teacher only acts as a facilitator (Prastowo, 2015). The syntax of DL learning models can be integrated in modules (Nugroho & Subiyantoro, 2018). The development of a plant module DL model is expected to replace the textbook in learning plant material.

Preparation of plant modules and the use of environment as a learning resource with the DL model require in-depth knowledge of plants in the school environment. Teacher's knowledge influences students' understanding of the subject matter (Jadama, 2014). Hikmah (2018) adds that teacher competence affects student motivation and learning outcomes. Therefore, teacher knowledge needs to improve through identifying plants in school environment.

The purpose of this development research is to describe the validity and effectiveness of the modules DL model based on the results of plant identification. The benefits of this study are to provide alternative teaching materials with the DL model to improve the learning outcomes.

METHODS

This research is a development research. The product developed is a learning module for plant material model DL following Sugiyono (2015) which consists of 10 steps (figure 1).

At the design stage of a large-scale trial, the pretest-posttest control group design was used for the analysis of learning outcomes, while the learning outcomes of affective and psychomotor used posttest-only control design. The results of the assessment of cognitive and psychomotor were analyzed by the t test, the results of affective assessment were analyzed descriptively. The development module is declared effective if the classical completion of the experimental class is ≥75% and there is a significant difference in the control class and the experiment class.

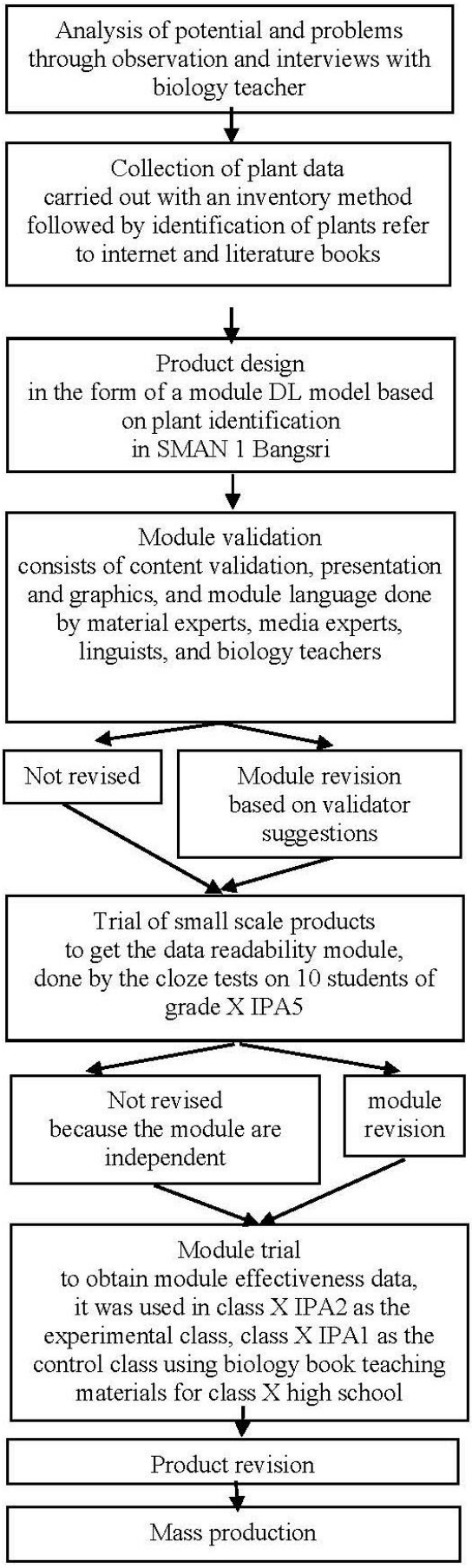

Figure 1. Stages of research

RESULTS AND DISCUSSION

The potential and problems found in SMAN 1 Bangsri from observations and interviews with biology teachers are presented in Table 1. School has potential to overcome problems in SMAN 1 Bangsri, namely the use of environment as a source of learning plant material maximally by applying learning models according to the 2013 curriculum to improve learning outcomes.

Identification of plants in SMAN 1 Bangsri was found 147 plants from 3 divisions, namely Bryophyta, Pteridophyta, and Spermatophyta. Bryophyta was found 5 species from 4 families representing the Hepaticopsida, Anthocerotopsida, and Bryopsida classes. Pteridophytes were found 11 species representing the Lycopsida, Equisetopsida, and Pteropsida classes. Spermatophytes were found including Gymnosperms and Angiosperms. There are 4 species of gymnosperms from 4 families that represent the class Pinopsida, Cycadopsida, and Gnetopsida. Angiosperms of the Magnoliopsida class were found mostly as many as 81 species from 40 families, while the Liliopsida class was 46 species from 14 families.

The identification results show that plants in SMAN 1 Bangsri are suitable as a source of development of teaching materials and as learning media, because there are various types of plants that represent plant material that students need to learn. This is consistent with the opinion which states that the school environment has potential as a learning resource (Najmulmunir, 2010).

Plants that not found in SMAN 1 Bangsri are ferns from the Psilopsida class and seed plants from the Ginkgopsida class, because many members of Psilopsida are extinct (Agrawal & Danai, 2017). Examples of surviving Psilopsida in the tropics and sub-tropics are the Psilotum genus (Nazarian et al., 2010). Ginkgopsida members are also rarely found because it is an endemic Chinese plant although it is now widely grown wild in Northeast Asia and is starting to be cultivated as an ornamental plant in temperate regions (Zhao et al., 2010). Therefore, learning these plant groups uses images and descriptions obtained from the internet.

Table 1. Potential and Problems in SMAN 1 Bangsri

Potency	Problem
SMAN 1 Bangsri is a national adiwiyata school so that there are environmentally sound school policies, environment-based curricula, participatory based environmental activities, and environmentally friendly management of supporting infrastructure.	Lack of student awareness to preserve the environment.
Curriculum in schools is the 2013 Curriculum which suggests the implementation of learning models one of which is Discovery Learning.	There is no teaching material for the Discovery Learning model. The teaching material used comes from a publisher which is still found to be deficient. Classical completeness of learning outcomes of plant material in the 2016/2017 school year is only 45%.
There are various types of plants in the school environment that come from 3 divisio which must be studied in plant material, namely Bryophyta, Pteridophyta, and Spermatophyta	The use of the environment as a learning resource is not optimal because students are not always invited to the school environment when the learning process is due to time constraints, and plants that are used as learning media are only plants that are already known by teachers and students

The development of teaching materials based on plant identification in the school environment can improve learning outcomes (Izza et al., 2018; Rizqiyah et al., 2018; Rosalia et al., 2017). According to Sihotang & Sibuea (2015), the development teaching materials related with real life can make teaching materials contextually and more effective for improving student learns outcomes compared to textbooks. The development of teaching materials by teachers requires the creativity and knowledge of teachers about the surrounding environment so that teaching materials are in accordance with the availability of surrounding materials (Sadjati, 2012).

Characteristics that distinguish the plant module DL model with other teaching materials can be seen from the material aspects and learning scenarios. The plant module DL model uses photos and samples as much as possible from the results of plant identification in SMAN 1 Bangsri so students already know them in their daily lives. The learning module scenarios for development are adjusted to the characteristics of DL. DL-based teaching materials can improve learning outcomes because students organize and observe to find concepts to study (Toy et al., 2018).

Module development must be consider several factors such as accuracy of content, accuracy of coverage, digestibility, language use, illustration, packaging, and component completeness (Sadjati, 2012). The feasibility of the module can be seen from the results of validation. If there are shortcomings, then revisions are made so that the module is worthy of being used as teaching material (Ayriza, 2008). Module validation is carried out from three aspects, namely validation of content feasibility, feasibility of presentation and graphics, and language feasibility. The results of module validation can be seen in Table 2.

Table 2. Recapitulation of Module Validation Results

	Feasibility Content		Feasibility of presentation and Graphics		Language Feasibility	
	Validator 1	Validator 2	Validator 1	Validator 2	Validator 1	Validator 2
Validator value	81,3	87,5	92,5	95	91,7	91,7
Average	84,4		93,75		91,7	
Valid Criteria	Valid		very valid		Very valid	

Content validation shows that modules are developed based on concepts and theories that relevant to the field of science and in accordance with the latest developments in the science and results of research. Thus, the content of teaching materials can be scientifically accounted for correctly in terms of science (Sadjati, 2012). The results of the module content validation include valid criteria, but revisions made according to critics and suggestions from the validator. The scope of the material in the module matches the learning material requirements for class X high school students. The accuracy of the material and characteristics of the DL revised by adding references from the internet and research results.

The results of module presentations and graphics validation include very valid criteria. This shows that module presentation and graphics are good. The systematic presentation of material are consistent, logical, coherent, and balanced. The material presentation in the module is communicative and interactive so that it can motivate students to achieve competence. Presentation of complete material according to module systematic which is adjusted to the syntax of the DL model. The module size is in accordance with ISO, which is A4 size (210 mm x 297 mm). Design and typography cover balanced, proportional, attractive and easy to read. The design and typography of module contents are harmonious, letters are easy to read, and the use of variations in letters are not excessive. The revision of the module presentation is to replace the term concept map at the beginning of the module into a material map. In activities "need to be remembered" given key sentences to make it easier for students to remember the material. Word chopping errors in the table are fixed. Writing summaries changed from paragraphs to essential points so that students are easy to remember.

The results of language validation indicate that the module includes very valid criteria. This shows that the language used in the module corresponds to the level of social-emotional development of high school students, is easy to understand, can motivate students to learn modules, order sentences in accordance with the rules in Indonesian, and use terms in accordance with the Indonesian Dictionary and or terms technical biology. According to Sadjati (2012) good teaching materials using communicative language, short and straightforward sentences, delivery of coherent material, can motivate students to read, work on assignments, and generate curiosity to do further exploration of the topic being studied.

The plant module DL model after being validated, were tested on a small scale with the cloze test. The result of cloze test module is included in the independent criteria. This shows that the reading in module is easy to understand and can be used by the readers themselves. Some of the characteristics that must be possessed by modules include self instruction and user friendly. The use of modules in learning allows students to learn independently and not depend on others. The instructions and material delivered are helpful, the language used is simple, easy to understand, and uses general term (Prastowo, 2015).

Large-scale trials are conducted to determine the effectiveness and practicality of module. Module effectiveness is measured by analyzing student learning outcomes in cognitive, affective, and psychomotor domains. The learning outcomes in the cognitive domain of plant material in the experiment class and the control class students were obtained from the post-test results after students participated in the learning of plant material. Details of the post-test results can be seen in Table 3. The results of the analysis of the post-test value of the experimental class and the control class using the t test obtained the results of t count (3.387) > t table (1.995). There were significant differences in the results of the post-test between the control class and the experimental class and classical completeness >75% indicating that the plant module DL model was effectively used as teaching material.

Table 3. Student Post-test Results

Component	Post-test	
	Experiment Class	Control Class
The lowest value	48	40
The highest value	95	88
Average	75	65
Classical completeness	78%	44%

Table 4. Affective Value of Students

Predicate	Criteria	Experiment Class		Control Class	
		Total students	Percentage (%)	Total students	Percentage (%)
A	Very good	12	33	9	25
B	Good	24	67	27	75
C	Enough	-	0	-	0

Biology learning using modules is generally effective for improving student learning outcomes (Sugiyanto et al., 2013; Novana et al., 2014; Rohmiyati et al., 2016; Zubail et al., 2018). The use of learning modules gives students the opportunity to learn at their own pace, according to their level of ability and need (Ali et al., 2010). Competency testing in modules can provide feedback so students can know the results of their learning and immediately correct their mistakes. Learning using modules makes it easier for students to get subject matter, clear learning goals, generate motivation to learn, and students can master the subject thoroughly (Parmin & Peniati, 2012; Sani, 2014). The DL model in modules can change learning conditions active, creative, develop scientific attitudes and conceptual understanding (Kemendikbud, 2014; Febriana et al., 2017). Research results of Rosdiana et al. (2017) and Martaida et al. (2017) show that the use of DL modules can improve student learning outcomes in cognitive domain. The application of the model DL module can also overcome misconceptions, improve cognitive learning outcomes, and student motivation (Wulandari, 2017). Biological objects in the form of living things, so the learning process should provide direct experience students to explore nature (Ngabekti et al., 2017). Therefore the application of the model DL module combined with field surveys by utilizing local potential effectively improves student learning outcomes (Maflukha, 2015).

Learning outcomes in affective domain are obtained from observations when students take part in learning plant material. Details of affective values can be seen in Table 4.

Affective values of the experimental and control class students has 100% classical completeness. There is only a slight difference in the percentage of students who get a very good predicate in the experimental class (33%) > control class (25%). This is due to the application of the DL model in addition to influencing the learning outcomes of cognitive domain, it can also improve students' affective abilities such as spiritual attitude, cooperation, honesty, discipline, and courtesy (Sari et al., 2016). The application of DL combined with environmental use can improve environmental awareness (Amini, 2015).

Learning outcomes in psychomotor domain are obtained from observations when students take part in learning plant material. Details of student's psychomotor values can be seen in Table 5.

Table 5. Psychomotor Value of Students

Component	Experiment Class	Control Class
The lowest value	67	67
The highest value	97	92
Average	83	80
Classical completeness	97%	92%

Analysis of the psychomotor value of the experiment class and the control class obtained results of t count (-1,487) < t table (1,995) so that there were no significant differences in the psychomotor values of the control class and the experiment class. The psychomotor value of students was only slightly different from classical completeness in the experiment class (97%) > the control class (92%).

Table 6. Recapitulation of Student Response Questionnaire Results

	Point										Total	Total
	1	2	3	4	5	6	7	8	9	10		average
Average	3.61	3.33	3.00	3.45	3.21	3.76	3.52	3.18	3.52	3.52	34.09	3.41
Criteria	Very good	Good	Good	Good	Good	Very good	Very good	Good	Very good	Very good		Good

Note:
1. The module helps understand the material
2. Communicative language
3. Design, writing and interesting images
4. Description accompanied by examples in daily life
5. Clear guidance steps
6. Invites active students
7. Build knowledge little by little
8. Motivate students to learn
9. Helps study independently and in groups
10. The module is well used in plant learning

DL learning model influences the psychomotor domain of learning outcomes because it encourages students to be active in learning using the scientific approach (In'am & Hajar, 2017; Mahmoud, 2014). The DL model is able to trigger students curiosity, build students social skills while in groups, improve their skills in argue and speak in public, and try to find information to get the right concepts in learning material. This shows the application of the DL model has an effect on student learning outcomes in psychomotor domain because it can foster students' confidence in exploring their skills (Aslam & Auliandari, 2017). The use of the DL model module can improve students' generic science skills, for the module presented activities structured in the form of experiments and observations using the DL syntax. Every aspect of DL is integrated with aspects of generic science skills (Khabibah et al., 2017). In learning using a plant module DL model, students are given a stimulus that invites students to identify problems, foster curiosity, and the desire to make observations. In observation activities, students invited to collect and process data to solve problems then analyze the data to draw conclusions, making students confident about the results of the analysis communicated so that students can carry out discussions properly.

Data on module practicality obtained by using the questionnaire response of the experimental class after attending plant learning using the DL model module. The recapitulation of the results of filling out the questionnaire can be seen in Table 6.

The results of the students response questionnaire analysis state that the plant module DL model are practice and suitable to use. According to students its' well to use as a learn material for plant material. Modules also help students learn independently or in groups, demanding active students in the learning process, and help students understand plant material.

CONCLUSION

Based on the results of the study, it can be concluded that in the SMAN 1 Bangsri there are 147 species of plants included in 3 divisions, namely 5 species of Bryophyta, 11 species of Pteridophyta, and 134 species of Spermatophyta. The diversity of plants is worthy of being used as a source of learning because it has fulfilled the 3 divisio plants that need to learn. The results of validation the plant module DL model are valid criteria for material validation, validation of presentation and graphics, and language including very valid criteria so that it is suitable to be used as teaching material. Classical completeness of students after participating in learning uses plant modules in the cognitive domain 78%, psychomotor 97%, and affective 100%. The plant module DL model based on plant identification results in SMAN 1 Bangsri were effectively used as teaching material.

REFERENCES

Ali, R., Ghazi, S. R., & Khan, M. S. (2010). Effectiveness of Modular Teaching in Biology at Secondary Level. *Asian Social Science*. *6(9)*, 49-54.

Agrawal, T. & Danai, P. (2017). Fossil Early Psilophytian & Lycopodian, Spenopsida Lines of Evolution. *British Journal of Research*. 4(3), 1-4.

Amini, R. (2015). Outdoor Based Environmental Education Learning and Its Effect in Caring

Attitude Toward Environment. *Jurnal Pendidikan IPA Indonesia*. 4(1), 43-47.

Aslam, D. & Auliandari, L. (2017). Pengaruh Model Pembelajaran Discovery Learning Terhadap Hasil Belajar Siswa Materi Ekologi Berbantu Data Penelitian Iklim Mikro Ruang Terbuka Hijau Berdasarkan Habitus Vegetasi. *Prosiding Seminar Nasional Pendidikan*. 2(1), 272-281.

Astuti, T. I., Idrus, I., & Yennita. (2018). Penerapan Model Pembelajaran Discovery Learning Untuk Meningkatkan Hasil Belajar Pada Materi Biologi Siswa SMP. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi*. 2(1), 5-9.

Ayriza, Y. (2008). Penyusunan dan Validasi Modul "Social Life Skill" bagi Pendidik Anak-Anak Prasekolah. *Jurnal Penelitian dan Evaluasi Pendidikan*. 2(12), 214-231.

Cimer, A. (2012). What Makes Biology Learning Difficult and Effective: Students' Views. *Educational Research and Reviews*. 7(3), 61-71.

Çobanoğlu, E.O. & Şahin, B. (2009). Underlining the Problems in Biology Textbook for 10th Grades in High School Education Using the Suggestions of Practicing. Teachers. *Journal of Turkish Science Education*. 6(2), 75-90.

Febriana, R, Haryono, Y & Yusri, R. (2017). Effectiveness of Discovery Learning-Based Transformation Geometry Module. *International Conference on Mathematics and Science Education (ICMScE) IOP Publishing. Journal of Physics*: Conf. Series 895.

Guntur, Ariyati, E., & Titin. (2014). Efektivitas Metode Guided Discovery terhadap Hasil Belajar pada Materi Tumbuhan di SMAN 9 Pontianak. *Artikel Penelitian*. Pontianak: Universitas Tanjungpura. Retrieved from http://download.portalgaruda.org/article.php?article=278633&val=2338&title=efektivitas metode guided discovery terhadap hasil belajar pada materi plantae di sman 9 pontianak.

Hikmah, N. (2018). Pengaruh Kompetensi Guru dan Pengetahuan Awal Siswa terhadap Motivasi Belajar dan Implikasinya terhadap Hasil Belajar Ekonomi Siswa. *Indonesian Journal of Economics Education*. 1(1), 9-16.

In'am, A. & Hajar, S. (2017). Learning Geometry through Discovery Learning Using a ScientificApproach. *International Journal of Instruction*. 10(1), 55-70.

Istiani, R. M. & Retnoningsih, A. (2015). Pemanfaatan Lingkungan Sekolah Sebagai Sumber BelajarMenggunakan Metode Post To Post Pada Materi Klasifikasi Makhluk Hidup. *Unnes Journal of Biology Education*. 4(1), 70-80.

Izza, F. R., Retnoningsih, A., & Pukan, K. K. (2018). Pengembangan Kunci Determinasi Tumbuhan Hasil Eksplorasi Hutan Wisata Guci Kabupaten Tegal Untuk Sekolah Menengah Atas. *Indonesian Journal of Conservation*. 7(1), 119-129.

Jadama. L. M., (2014). Impact of Subject Matter Knowledge of a Teacher in Teaching and Learning Process. *Middle Eastern & African Journal of Educational Research.* (7), 20-29.

Kemendikbud. (2014). *Materi Pelatihan Guru Implementasi Kurikulum 2013 Tahun Ajaran 2014/2015*. Jakarta: Badan Pengembangan Sumber Daya Manusia Pendidikan dan Kebudayaan danPenjaminan Mutu Pendidikan.

Khabibah, E. K., Masykuri, M., & Maridi. The Effectiveness of Module Based on Discovery Learningto Increase Generic Science Skills. *Journal of Education and Learning*. 11(2), 146-153.

Maflukha, D. (2015). Pengembangan Modul Biologi Pembelajaran Discovery Learning Yang Dipadu Survey Lapangan Dengan Memanfaatkan Potensi Lokal Pada Materi Fungi SMA Kelas X Kurikulum 2013. *Jurnal Inkuiri*. 6(2), 147-156.

Mahmoud, A. K. A. (2014). The Effect of Using Discovery Learning Strategy in Teaching Grammatical Rules to First Year General Secondary Student on Developing Their Achievement and Metacognitive Skills. *International Journal of Innovation and Scientific Research*. 5(2), 146-153.

Marisa, P., Lestari, & Karno, R. (2016). Analisis Kesulitan Belajar Siswa pada Materi Tumbuhan Kelas X di SMAN 1 Rambah Hilir Tahun Pembelajaran 2014/2015. *E-journal Mahasiswa Prodi Biologi*. 2(1). Retrieved from http://e-journal.upp.ac.id/index.php/fkipbiologi/article/view/613/530.

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*. 7(6), 1-8.

Najmulmunir, N. (2010). Memanfaatkan Lingkungan di Sekitar Sekolah sebagai Pusat Sumber Belajar. *Jurnal Region*. 2(4), 1-9.

Nazarian, H., Taghavizad, R., & Khosrav, E. (2010). The First Anatomical Report and Morphological Reexamination of *Psilotum Nudum* L., in Iran. *Pak. J. Bot*., 42(6), 3723-3728.

Ngabekti, S., Ridlo, S., Peniati, E., & Martanto, R. (2017). Meta-Analysis of Jelajah Alam Sekitar (JAS) Approach Implementation in Learning Process. *Jurnal Pendidikan IPA Indonesia.* 6(1), 153-164.

Novana, T., Sajidan, & Maridi. (2014). Pengembangan Modul Inkuiri Terbimbing Berbasis Potensi Lokal pada Materi Tumbuhan Lumut (Bryophyta) dan Tumbuhan Paku (Pteridophyta). *Jurnal Inkuiri*. 3(2), 108-122.

Nugroho, A. A. & Subiyantoro. S. (2018). Integrasi Pembelajaran Guided Discovery dalam Modul Spermatophyta untuk Mahasiswa Pendidikan Biologi. *Jurnal Pendidikan Matematika dan IPA*. 9(1), 57-67.

Parmin & Peniati, E. (2012). Pengembangan Modul Mata Kuliah Strategi Belajar Mengajar IPA Berbasis Hasil Penelitian Pembelajaran. *Jurnal Pendidikan IPA Indonesia*. 1(1), 8-15.

Prastowo, A. (2015). *Panduan Kreatif Membuat Modul Inovatif*. Yogyakarta: Diva Press.

Rahman, M. H. (2017). Using Discovery Learning to Encourage Creative Thinking. *International Journal of Social Sciences & Educational Studies.* 4(2), 98-103.

Rizqiyah, I., Ngabekti, S., & Dewi, N. K. (2018). Species Richness of Spermatophyta Plants in Paseban Parks Bangkalan Madura to Develop Discovery Model on the Material Handout Plantae. *Journal of Innovative Science Education*. 7(1), 69-77.

Rohmiyati, N., Ashadi, A., & Utomo, S. B. (2016). Pengembangan Modul Kimia Berbasis Inkuiri Terbimbing pada Materi Reaksi Oksidasi-Reduksi. *Jurnal Inovasi Pendidikan IPA*. 2(2), 223-229.

Rosalia, R., Yani, A. P., & Kasrina. (2017). Pengembangan LKS Berdasarkan Hasil Studi Identifikasi Jenis Bambu di Desa Harapan Makmur. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi.* 1(1), 93-102.

Rosdiana, Boleng, D. T. & Susilo. (2017). Pengaruh Penggunaan Model Discovery Learning Terhadap Efektivitas dan Hasil Belajar Siswa. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*. 2(8), 1060-1064.

Sadjati, I. M. (2012). Hakikat Bahan Ajar. Dalam: *Pengembangan Bahan Ajar*. Jakarta: Universitas Terbuka. Hlm. 1-62.

Safitri, O. I., Retnoningsih, A., & Irsadi, A. (2014). Penerapan Outdoor Learning Process (OLP) Menggunakan Papan Klasifikasi Pada Materi Klasifikasi Tumbuhan. *Unnes Journal Of Biology Education*. 3(1), 61-68.

Sani, R.A. (2014). *Inovasi pembelajaran*. Jakarta : Bumi Aksara.

Sari, E. N., Ridlo, S., & Utami, N. R. (2016). Pengaruh Model Pembelajaran Discovery Learning dengan Mind Mapping Terhadap Hasil Belajar Siswa pada Materi Sel di SMA. *Unnes Science Education Journal*. 5(3), 1403-1407.

Sihotang, C. & Sibuea, A. M. (2015). Pengembangan Buku Ajar Berbasis Kontekstual Dengan Tema Sehat Itu Penting. *Jurnal Teknologi Informasi & Komunikasi dalam Pendidikan.* 2(2), 169-179.

Sugiyanto, Kartika, I., & Purwanto, J. (2012). Pengembangan Modul IPA Terpadu Berbasis Sains Lingkungan Teknologi Masyarakat. *Jurnal Kependidikan*. 42(1), 54-60.

Sugiyono. (2015). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R & D (cetakan ke-21)*. Bandung: Alfabeta.

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*. 1(1), 22-29.

Syamsudduha, S. & Rapi, M. (2012). Penggunaan Lingkungan Sekolah Sebagai Sumber Belajar dalam Meningkatkan Hasil Belajar Biologi. *Jurnal Lentera Pendidikan*. 15(1), 18-31.

Toy, B. A. I., Karwur, F. F., da Costa, J. F., Langkun, J. F., & Rondonuwu, F. S. (2018). Desain Bahan Ajar Biologi Berbasis Discovery Learning dengan Scientific Approach untuk Materi Jamur di Kelas X SMA. *Biosfer: Jurnal Pendidikan Biologi*.11(1), 67-75.

Wulandari, P. (2017). Penerapan Modul Berbasis Discovery Learning dalam Mengatasi Miskonsepsi, Meningkatkan Hasil Belajar Kognitif dan Motivasi Siswa Pada Materi Sel di MAN Darussalam. *Electronic Thesis And Dissertation Unsyiah*. Retrivied from http://etd.unsyiah.ac.id/index.php?p=show_detail&id=33293.

Zarisma, U., Qurbaniah, M., & Muldayanti, N. D., (2016). Identifikasi Kesulitan Belajar Siswa pada Materi Dunia Tumbuhan Kelas X SMA Negeri I Sambas. *Jurnal Biologi Education*. 3(2), 33-41.

Zhao, Y., Paule, J., Fu, C., & Koch, M. A. (2010). Out of China: Distribution history of *Ginkgo biloba* L. *Taxon*. 59(2). 495-504.

Zubail, D. R., Retnoningsih, A., & Ngabekti, S. (2018). Development of Natural Plant Module Approach Around as a Learning Resource in UIN Walisongo Semarang. *Journal of Innovative Science Education*. 7(2), 150-160.