Unnes.J.Biol.Educ. 9 (3) (2020)

Journal of Biology Education

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

The Development of E-catalog of Seed Plants based on Mini Research in Semirang Tourism Area as a Supplement to Learning Plantae in Senior High Schools

Lilif Yulalifah[1]✉, Sri Ngabekti[1]

[1]Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

Article Info

Article History:
Received: August 2020
Accepted: September 2020
Published: December 2020

Keywords:
E-catalog of seed plants, Semirang tourism area, a Learning supplement of Plantae

Abstract

Semirang tourism area has natural potential that can be utilized as a source of learning, one of which is seed plants. The Semirang area is located in Gogik Village, West Ungaran District, Semarang Regency with an altitude above 700 meters above sea level. Seed plants have important values for humans and the environment, among others; economic, aesthetic, educational, endemic, conservation, and cultural values. This study aims to identify the richness of the species of seed plants in the Semirang tourism area as a learning supplement for Plantae material in High School. This study was designed with a modified Research and Development (R&D) method. The results of the identification of seed plants in the Semirang tourism area recorded 88 species of seed plants which are divided into 5 divisions, 6 classes, 32 orders, and 48 families dominated by angiosperm. The percentage of gymnosperms is 5.68% and the percentage of angiosperms is 94.32%. E-catalog of seed plants that has been developed has obtained very suitable criteria for supplementing plantae material in class X-Mathematics and Natural Sciences students. The result of the acquisition of 85.83% of material experts (V1); 97.81% of media experts (V2); and 73.50% of media experts (V3). Teacher responses received a score of 97.91%, student responses to the e-catalog obtained a percentage of 83.50% and student responses regarding attitudes of concern for plant preservation gained a percentage of 85.00%.

✉ Correspondence Address:
D6 Building 1st Floor Jl Raya Sekaran Gunungpati Semarang
E-mail: lilifcintabiologi@gmail.com

p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

Seed plants have important values for humans and the environment including economic, aesthetic, educational, endemic, conservation, and cultural values. This value causes many people who take flora to be traded and used as a source of income. Excessive exploitation of flora without considering the balance of the population in nature will negatively impact the preservation of flora. The flora resources in their habitat have declined, and it is even possible that at some time the community will lose these resources.

Semirang Tourism Area is a combination of several types of habitats in one area and is one of the main alternative tourist attractions for residents of Ungaran which are directly adjacent to Mount Ungaran. Unspoiled areas cause a high diversity of seed plants in the region. But with the increasing number of visitors who come causing a decrease in the quality of existing habitat. This decline in quality causes the population to begin to decline (impact on) the species that exist in the region, especially flora which is very sensitive to environmental changes. Given the important role of seed species in the balance of ecosystems, it is necessary to conserve seed plants to support ecotourism in the region. As a first step, it is necessary to research the wealth of seed species of plants in the Semirang area.

Education is a conscious and planned effort to develop self-potential and realize an atmosphere of active student learning. The learning process occurs because of the interaction between a person and his environment. Learning activities can be done anytime and anywhere. One sign that a person is learning is a change in behavior in that person which may be caused by changes in the level of knowledge, skills, and attitudes (Arsyad, 2011). Learning is a process of interaction between students and educators and learning resources in a learning environment (Kemendikbud, 2011). Seed plant material is a sub material from plantae material that can be taught by utilizing the surrounding natural environment as a source of learning. Plantae is a biology class X high school learning material included in KD 3.7 and 4.7.

Based on interviews with biology teachers at SMA Kesatrian 1 Semarang, learning is often done in the classroom using the lecture method accompanied by textbooks and direct observation of plants in school. However, given the limited land available in schools causes the limited diversity of plants observed by students, so the need for learning media that is able to increase student knowledge about various types of plants to improve students' understanding of Plantae material. In addition, observations from the learning process at school show that most students tend to be lazy to bring textbooks for reasons of forgetfulness, weight, etc. This shows that students need learning resources that can be carried easily, and practically to always be taken to school and provide a real picture related to Plantae material, so that it helps in the learning process.

Virvou *et al.,* (2005) stated that in addition to learning models and methods, which must be considered are learning resources, media, and teaching materials. This will greatly assist students in learning biological concepts. Winarti *et al.,* (2016) said that complete learning is one of the necessities in learning to use the 2013 curriculum. So it is very necessary to have a learning supplement to help and increase students' knowledge in learning plantae material, especially regarding seed plants.

Existing learning resources have not utilized the potential that is around to be used as learning resources. The surrounding environment has potential as a source of actual and contextual biology learning. Semirang Tourism Area is one part of the Ungaran mountain area which has the potential to be used as a source of biology students. This is because the Semirang tourism area has not yet been fragmented and deforested into agricultural land

According to Widalismana *et al.,* (2016) the use of catalogs in learning activities can improve student learning activities and outcomes. The catalog is one of the means of information both print, online, and file that presents images.

School difficulties in organizing learning outside the classroom is the determination of time because it requires a long time, requires cost, means of transportation, and energy. These limitations make teachers prefer to bring learning objects into the classroom for learning activities. Therefore learning supplements are needed from the results of the exploration of seed plants in Semirang Tourism Area to maximize student learning on Plantae material and the point is by learning and better understanding Plantae material along

with the richness of plant species especially seed plants will apply the level of concern for students to preserve the richness of plant species so that it is necessary presumably conducted research with the title "Development of E-Catalog of Seed Plants Based on Mini Research in Semirang Tourism Area as a supplement to Learning Plantae in high school". The readibility test was carried out using a readibility questionnare for class X students of SMA Kesatrian 1 Semarang through a small-scale trial totaling 15 students with different levels of ability.

RESEARCH METHOD

This study uses a modified Research and Development (RnD) method from Sugiyono (2015). The product produced from this research is a learning supplement in the form of a mini research-based plant E-catalog media in Semirang Tourism area. Seedling plant exploration is carried out in the Semirang, Gogik Village, West Ungaran District, Semarang Regency. Partial identification of seed plants is carried out directly at the location and partly done by Semarang State University. Development of e-catalog and validity assessment carried out at Semarang State University. The product trial was conducted at SMA Kesatrian 1 Semarang. The study was conducted in March 2019 - February 2020.

The product in the form of an E-catalog was compiled based on the results of mini-research using the method of exploring the richness of seeded plant species in Semirang Tourism Area. The collection of pictures/photos of seed plants is used as the material in the preparation of the E-catalog. Aside from exploration results, the developed E-catalog is also sourced from other references that are relevant to the material. After making observations and obtaining observational data, then a e-catalog design was done to design the appearance of the research product, and then it was validated and tested. E-catalog of seed plants based mini-research in the Semirang tourism area which were developed will be validated by material experts, media experts, and biology teachers. The readability test was carried out using a readability questionnaire for class X students of SMA Kesatrian 1 Semarang through a small-scale trial totaling 15 students with different levels of ability. In addition to filling out the questionnaire responses to the readability of the E-catalog readability questionnaire, students also filled out a questionnaire on the attitudes of concern for the preservation of plants after studying the E-catalog of seed plants.

RESULT AND DISCUSSION

The results of this study include data on seed species of plants in Semirang Tourism area and the feasibility of a mini research-based Seed Plant Seedlings in Semirang Tourism area as a supplement to learning plantae material in high school.

The Seed plants that found in Semirang Tourism Forest

The results of the identification of seed plants in Semirang Tourism Area recorded 88 species of seed plants which are divided into 5 divisions, 6 classes, 32 orders, and 48 families dominated by angiosperms. Data collection was carried out in several sub-areas, namely watersheds, nutmeg plantations, secondary forests, and areas around waterfalls. This research will produce several observation points where the characteristics of seed plants from each sub-area are different.

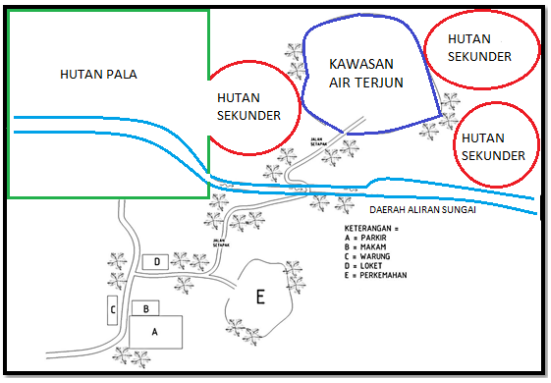

Figure 1 The map of observation location of seed plants in Semirang tourism area (Imagery©2015CNES/Astrium/SpotImage/DigitalGlobe/MapData©2015 Google; Ngabekti 2011)

Semirang Tourism Area is an eco-tourism area with topography in the form of rivers, forest tours, waterfalls, and residential areas. According to Oldeman's classification in Ngabekti (2011), mentioning Semirang Tourism Area is located at an altitude above 700 meters above sea level with an average monthly temperature of 32°C and an average rainfall of 2000-3000 mm/year. The ecological conditions of Semirang tourism nature so strongly support the growth of seed plants that can flourish in tropical forests. Tropical plants can grow well in environments with a temperature range of 22°C - 35°C, with rainfall 2000-3000 mm/year (Hanum, 2008).

The number of plant species of Angiosperms group is more commonly found, although some species of Gymnosperms plants are also found in the Semirang Tourism Area, so that the area is dominated by Angiosperms plants. This is because Angiosperms plants have more pollination methods than Gymnosperms plants which pollination can only occur through anemogamy methods. Sunarti and Rugayah (2013) in their research stated that gymnosperm is a group of plant having seed not enclosed in an ovary. The seed develop either on the surface of scale or leaves, often modified to form cones or at the end of short stalks. The group consist of Conifers, Cycads, Ginkgo and Gnetales. About 800-900 species recognized and Conifer conducted reported as the highest species diversity (500-600 species) followed by Cycads (75-80 species). In addition, the relatively short interval between pollination and fertilization also supports the many species of Angiosperms growing in the area. The identified plants are plants from the Gymnosperms and Angiosperms groups in the form of shrubs and trees that outline the material in learning plant classification so that it can be used as a learning medium.

Characteristics of the E-catalog of Seed Plants based on Mini Research in Semirang Tourism Area

The e-catalog that was developed was limited to discussing the world of plants, especially seed plants which were found in Semirang tourism area. Students are able to apply the principle of classification to classify seed plants into divisions based on morphological characteristics with the identification guidelines contained in the E-catalog. In addition to material on seed plants, the E-catalog is equipped with additional information not found in the student handbook. The material is in the form of morphological description accompanied by pictures per species of seed plants which are found in Semirang Tourism Area. According to Riyono & Retnoningsih (2015), the use of images in learning can motivate students and cause high student curiosity about the images presented.

The e-catalog is used as an alternative medium for studying seed material. Media E-catalog is run on smartphones with an Android-based operating system. Smartphones are items that are familiar to students. Research conducted by Saputra (2017) states that 96% of students are familiar and used to using smartphones. The developed e-catalog is a mobile learning application that is adapted to applications that are widely used by students. The existence of an E-catalog that is used to clarify the presentation of material can increase learning motivation and be able to overcome the limitations of space, and time so that learning is more effective and efficient to be carried out anywhere and anytime. The developed e-catalog is easy to run by students with a simple navigation button so that it is easy for users to understand for the first time. Amirullah and Hardinata (2015) in their research stated that media that have a clean, neat appearance and have good quality in aspects of writing, software engineering, and appearance are the characteristics of good media.

Presentation of the E-catalog material begins with introductory material on plant understanding, plant classification, breeding, and role. After students learn the preliminary material, students are directed towards the subject matter, which is presented data from observations made at the Semirang Tourism Area, presented material on the classification of seed plants accompanied by morphological descriptions and the role of seed plants for life. The e-catalog design is presented in the following figure.

Image 2 The front page of e-catalog

Image 3 The display *log in* of e-catalog

Image 4 Homepage of e-catalog

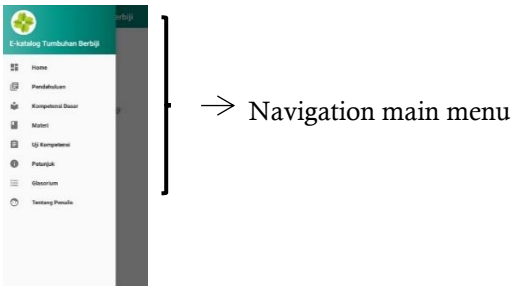

Image 5 The display of main menu

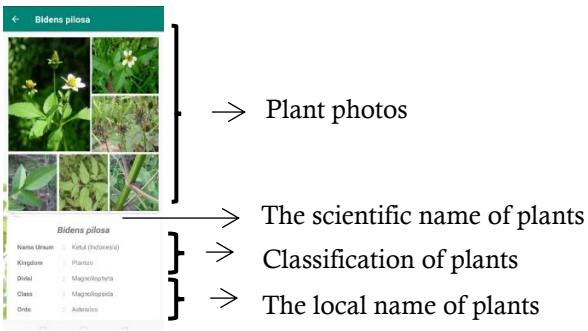

Image 6 Layout image

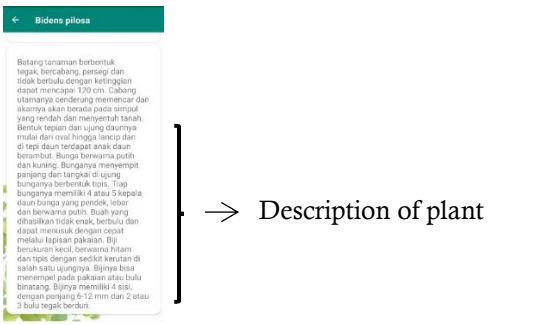

Image 7 Morphological description of plant

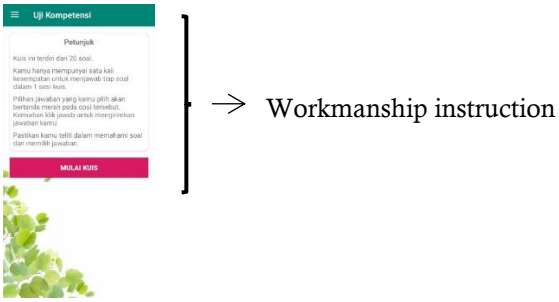

Image 8 Exercises

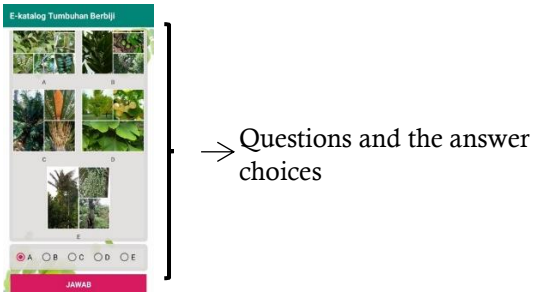

Image 9 Exercies

The material presented in the E-catalog encourages students to explore unknown knowledge by creating a feeling of pleasure when reading so as to encourage students to study the E-catalog completely. The use of E-catalogs brings benefits with the ability to replace concrete learning so as to minimize the cost and time required for learning. However, the content of the material presented still needs to be sorted out again so that students are easier to learn by students.

E-catalog of seed plants that developed is equipped with a glossary. The glossary in the E-catalog aims to help students understand terms in taxonomy and morphology. The morphological image of the plant shown includes several organs owned by the plant including the roots, stems, leaves, flowers, and fruit. The images shown are intended to facilitate students in analyzing the morphological characteristics of each plant.

The Feasibility of the E-catalogue of Seed Plants

E-catalog of seed plants based mini-research in the Semirang tourism area which were developed has been validated by material experts, media experts, and biology teachers. Muhammad Abdullah S.Sc., M.Sc., as a material expert (V1), Dr. Sigit Saptono, M.Pd., as a media expert (V2) from the Department of Biology, and Riza Arifudin S.Pd., M.Cs., as a media expert (V3) from the Department of Computer Science, and Drs. Mulyono, M.Pd, as a biology teacher at SMA Kesatrian 1 Semarang. Based on the criteria for the level of feasibility of teaching materials according to Arikunto (2010) and Akbar (2013), the score indicates that the E-catalogs developed fit into the feasible category.

Table 2 Results of the Validation of the E-catalog of Seed Plants based on Mini-Research in the Semirang Tourism Area

No.	Validator	Percentage	Criteria
1	Material (V1)	85,83%	Very feasible and does not need to be revised
2	Media (V2)	97,81%	Very feasible and does not need to be revised
3	Media (V3)	73,50%	Feasible and does not need to be revised
3	Biology Teacher	97,91%	Very feasible and does not need to be revised
	Percentage of average	88,76%	Very feasible and does not need to be revised

Overall assessments by validators and biology teachers get an average percentage of 88.76% with very decent criteria. This is supported by research from Safitri *et al.,* (2018) which received an average percentage of 92% in developing the taxonomic album of seed plants in the Linggo Asri forest. Thus the developed E-catalog meets the eligibility standards according to BNSP in 2014 so that the E-catalog developed is fit to be used as a learning supplement on Plantae material, especially seed plants.

Readibility of the E-catalog of Seed Plants based on Mini Research in Semirang Tourism Area

The readability test was carried out using a readability questionnaire for class X students of SMA Kesatrian 1 Semarang through a small-scale trial totaling 15 students with different levels of ability. The level of ability is seen based on recommendations from biology teachers as well as students' final semester exam scores. The level of student ability is divided into three criteria, namely a high ability of five students, a medium ability of five students, and a low ability of five students. The questionnaire consisted of 10 aspects that contained positive statements. Students give positive responses to the E-catalog as a learning supplement. The recapitulation of student responses to the E-catalog can be seen in Figure 1 and Table 3.

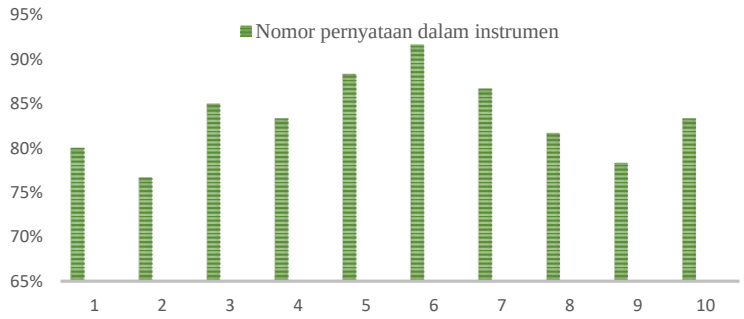

Figure 1 Recapitulation of student responses to the e-catalog

Table 3 Recapitulation of student responses to the e-catalog

No	Statement in the Instrument	Score	Percentage	Criteria
1	Media e-catalog easily installed and applied	48	80,00%	Feasible
2	E-catalog is making me more excited in studying biology	46	76,67%	Feasible

3	Images/photos attract me to learn the material	51	85,00%	Very Feasible
4	Presentation of material in this e-catalog is presented systematically	50	83,33%	Very Feasible
5	Submission of material in this e-catalog relating to daily life	53	88,33%	Very Feasible
6	The e-catalog is equipped with photos/images supporting material	55	91,67%	Very Feasible
7	The use of e-catalog brings benefits, as well as minimizing the cost and time spent on learning	52	86,67%	Very Feasible
8	I understand the language used in the e-catalog	49	81,67%	Very Feasible
9	The language cultivates the feeling of pleasure when I read it	47	78,33%	Feasible
10	Letters used are clear and easy to read	50	83,33%	Very Feasible
	Average		83,50%	Very Feasible

Small-scale trials were conducted on fifteen students of SMA Kesatrian 1 Semarang with different levels of ability. The small-scale trial aims to determine the readability of the e-catalog. Steudents are asked to fill out a questionnaire about the e-catalog that was developed. Filling in the questionnaire aims to determine student responses to the developed e-catalog. The average percentage value obtained from the small-scale student questionnaire responses was 83,50%. Readability referred to in textbook writing is the extent to which students can understand the material presented in various written languages (Sitepu, 2012: 120). Based on the criteria for the readibility level of teaching materials according to Rosmaini (2009), the score is included in the category of easy to understand. This category by students shows that the e-catalog developed is suitable to be used as a supplement to learning plantae material in high school.

Students Responses Regarding Attitudes of Concern for Plant Sustainability

In addition to filling out the questionnaire responses to the readability of the E-catalog readability questionnaire, students also filled out a questionnaire on the attitudes of concern for the preservation of plants after studying the E-catalog of seed plants. The questionnaire consisted of ten aspects that contained positive statements. The recapitulation of student responses questionnaire can be seen in table 4.

Table 4 Recapitulation of the students responses regarding attitudes of concern for the preservation of plants

No	Respondents	Frequency	Percentage	Criteria
1	Students of high ability	5	91,67%	Entrenched
2	Students of medium ability	5	85,00%	Entrenched
3	Students of low ability	5	78,33%	Start growing
The average percentage			85,00%	Entrenched

E-catalogs do not just provide information about seed plants. However, it facilitates students to hone critical and creative thinking skills. The e-catalog presented material definitions in general towards more specific material accompanied by quizzes to invite students to evaluate the extent of understanding the knowledge of seed plants, then students can understand themselves about seed plants with their own language and understanding. The material presented in the E-catalog is adjusted to the learning objectives achieved. Quiz that contains questions aimed at evaluating students, so they can find out how well students understand in understanding the material that has been learned. Evaluation is very important to be done in the learning process as a measuring tool to find out success in learning (Suryani 2017; Mahirah, 2017).

The e-catalog is one of the contextual learning resources because it was developed based on the results of a mini research of seed plants at Semana Tourism Park. The developed e-catalog has fulfilled the requirements as a good learning resource that is, practical, economical, easy to operate, and relevant to basic competencies so that learning objectives are expected to be achieved.

The character of caring for the environment is needed by every individual so that the environment can be sustainable. Caring for the environment is the attitude and actions that always strive to maintain and preserve the environment from damage caused by nature and humans (Al-Anwari, 2014). The problem of environmental damage is not new. Especially at this time the world is threatened by global warming due to human activities. This is caused by the lack of environmental care character in each individual (Ardianti et

al., 2017). Therefore, it is necessary to character education about the environment from an early age and at school (Purwanti, 2017).

In addition to filling out the questionnaire responses to the readability of the E-catalog, students also filled out a questionnaire on the attitudes of concern for the preservation of plants after studying the E-catalog of seed plants. The average percentage value obtained from the student questionnaire responses was 85.00%. Based on the criteria for the level of character development according to the Ministry of National Education (2010) the score is included in the category of culture. Even in the concept of character education states that character education must be done for life so that character can be entrenched (Setiawati, 2017). This shows that the attitude of concern of the Kesatrian 1 Semarang High School students towards plant preservation is entrenched.

The developed e-catalog certainly has limitations and shortcomings. These limitations include the operation of the application requires an internet network, if it does not use the internet network, the plant morphology image does not appear. Besides, if the internet quality is not good then the process of appearing images on the E-catalog will take a little longer. The existence of seed catalog e-plants is expected to facilitate students in learning material by providing additional new insights about the diverse seed plants in Semirang Tourism Area and its beauty, thereby increasing student awareness in increasing attitudes to care for the environment so that plant preservation is maintained.

Based on the above data as a whole the E-catalog of Seed Plants in Semirang tourism area is suitable to be used as a supplement in the learning of Plantae material biology with very good criteria. Based on the results of the student character questionnaire, the character concerned about the preservation of plants began to become entrenched so that the e-catalog of seed plants that were developed could be used as guidelines to help students identify seed plants when conducting direct exploration in the Semirang tourism area.

CONCLUSION

Based on the results of the identification of seed plants in Semirang Tourism Area, recorded 88 species of seed plants tang divided into 5 divisions, 6 classes, 32 orders, and 48 families dominated by angiosperms plants. The catalogs that were developed were limited to discussing the world of plants, especially the seed plants which were found in the Semirang Tourism Area. In addition to material on seed plants, e-calatog is supplemented with additional information not found in the student handbook. The material is in the form of morphological description accompanied by pictures per species of seed plants found in Semirang Tourism area. Seed research e-catalog of mini-based research at Wana Wisata Semirang that has been developed has obtained the criteria to be used as a supplement to learning biology, especially in the material for grade X seeded high school plants based on the results of the assessment by material validator (V1) 85.83%, media validator (V2) 97.91%, media validator (V3) 73.50%, biology teacher responses 97.91%. Based on the questionnaire students' responses to the feasibility of the E-catalog as a learning supplement obtained an average score of 83.50, meaning that the E-catalog is very appropriate to be used as a learning supplement that is easily understood by students. Based on the results of the student character questionnaire, characters concerned about the preservation of plants began to entrench.

REFERENCES

Abdullah R. 2012. Pembelajaran berbasis Pemanfaatan Sumber Belajar. *Jurnal Ilmiah DIDAKTIKA* 12 (2) 216-231. 2012.

Al-Anwari, A. M. 2014. Strategi Pembentukan Karakter Peduli Lingkugan di Sekolah Adiwiyata Mandiri. *Ta'adib.* 19 (2): 227-257.

Amirullah, G. and R. Hardinata. 2015. Pengembangan Mobile Learning bagi Pembelajaran. *Jurnal Kesejahteraan Keluarga dan Pendidikan* 4 (2): 97-101. 2009.

Ardianti, S. D. 2017. Peningkatan Perilaku peduli Lingkungan dan tanggung Jawab Siswa Melalui Model Ejas dengan Pendekatan Science Edutainment. *Jurnal Ilmiah Pendidikan Dasar*. 4 (1): 1-17.

Arikunto, S. 2013. *Dasar-Dasar Evaluasi Pendidikan Edisi 2.* Jakarta: Bumi Aksara.

_____2013. *Prosedur Penelitian Suatu Pendekatan Praktik.* Jakarta: Rineka Cipta.

Arsyad, A. 2011. *Media Pembelajaran.* Jakarta : PT Raja Grafindo Persada.

B. P. Sitepu. 2012. *Penulisan Buku Teks Pelajaran.* Bandung:PT. Remaja Rosdakarya.

BNSP. 2014. *Prosedur Operasi Standar Penyelenggaraan Buku teks Pelajaran dan Buku Panduan Guru Pola "Inisiatif Masyarakat".* Jakarta: Peraturan Badan Standar Nasional Pendidikan Nomor: 0041/P/BNSP/VIII/2014.

Hanum, C. 2008. *Teknik Budidaya Tanaman Jilid 2 (bse).* Jakarta: Departemen Pendidikan Nasional.

Kemendikbud. 2016. *Silabus Mata Pelajaran Sekolah Menengah Atas/Madrasah Aliyah (SMA/MA)*. Jakarta: Kementrian Pendidikan dan Kebudayaan.

Kemendiknas. 2010. *Kerangka Acuan Pendidikan Karakter Tahun Anggaran 2010*. Jakarta: Balitbang.

Mahirah, B. 2017. Evaluasi Belajar Pesera Didik. *Jurnal Idaarah*. 1(2): 257-267.

Purwanti, D. 2017. Pendidikan Karakter Peduli Lingkungan dan Implementasinya. *Dwijacendekia Jurnal Riset Pedagogik*. 1(2): 14-20.

Rosmaini. 2009. *Keterbacaan Buku Teks*. Medan: FBS UNIMED

Riyono, B. and A. Retnoningsih. 2015. Efektivitas Model Pembelajaran *Picture and Picture* dengan Strategi Inkuiri terhadap Motivasi dan Hasil Belajar Siswa. *Journal of Biology Education* 4 (2) (2015) 166-172.

Safitri, N.F., A. Retnoningsih., E. Purwantoyo. 2018. Pengembangan Album Taksonomi Tumbuhan Berbiji di Hutan Linggo Asri sebagai media Belajar Materi Klasifikasi Tumbuhan. Journal Biology Education. 6 (2): 5-6.

Saputra, G. E. A. 2017. Pengaruh *Smartphone* terhadap Aktivitas Belajar Siswa Kelas X SMA Muhammadiyah 7 Yogyakarta. *Naskah Publikasi*. Yogyakarta: Universitas Muhammadiyah Yogyakarta.

Setiawati, N.A. 2017. Pendidikan Karakter sebagai Pilar Pembentukan Karakter Bangsa. *Prosiding Seminar nasional Tahunan Fakultas Ilmu Sosial Universitas Negeri Medan*. 1(1): 348-352.

Sugiyono. 2012. *Metode Penelitian dan pengembangan Reseach and Developmet*. Jakarta: Alfabeta.

Sunarti, Siti and Rugayah. 2013. The Diversity of Gymnosperm from Wawoni Island, S.E. Sulawesi). *Jurnal Biologi Indonesia.* 9 (1): 83-92 (2013)

Suryani, Y.A. 2017. Pemetaan Kualitas Empirik Soal Ujian kahir Semester pada Mata Pelajaran Bahasa Indonesia SMA di Kabupaten Klaten. *Jurnal Penelitian dan Evaluasi Pendidikan*. 21 (2): 142-152.

Virvou, M., Katsionis, G., and Manos, K. 2005. Combining Software Games with Education: Evaluation of its Educational Effectiveness. *Educational Technology & Society*, 8 (2), 54-65.

Widalismana, M., Baedhowi, and H. Sawiji. 2016. Pengembangan Media Berbasis Katalog untuk Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran Ekonomi di SMA Negeri 5 Surakarta. *Jurnal FKIP* 1 (2) (2016).

Winarti, Y., Indriyanti, D. R., Rahayu, E. S. 2016. Pengembangan Bahan Ajar Ekologi Kurikulum 2013 Bermuatan SETS melalui Penerapan Model Problem Based Learning. *Unnes Science Education Journal* 5 (1): 1070-1078.