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The Development of Linggo Asri Forest Seeds Plant Taxonomy Album as Learning Media of Plant Classification

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Abstract

The success of learning are determined by many factors, one of them is the use of learning media as learning source. The operation of learning media needs to be keyed to students' need and characteristics. The effective learning media which is used in the plant materials is media that use the plants around the students as learning sources. The operation of learning media will be more efficient if it is packed with easy and understandable media for students. This research aims to develop the effective and efficient learning media for applying in the plants material. This research uses Research and Development (RnD) method. The developed product is an album of seeds plants in the Linggo Asri Forest as a learning media. This research purposes to identify the seeds plants species in the Linggo Asri forest and also to analyze the feasibility of the album in the learning process. The proper test was done by material and media expert, teacher and also students of X.MIA SMA N 1 Kajen. The validator assessment showed that the album is proper to be applied in the learning process. The effectiveness test showed that learning process using the album is effective from the high of students' learning outcome and passing percentage.

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INTRODUCTION

The result of National Examination (UN) 2016, Senior High School score average has been declined for latest four years because of students' poor understanding to the concepts tested (Kemdikbud 2014, 2016). The students' learning acquisition for 9 out of 12 Biology competencies had been fallen. According to Widoyoko (2006), the quality of learning' outcome is influenced by quality of learning process. The success of learning is determined by many things; for example, the use of learning media as learning source and the chosen learning method. The inappropriate learning method would give negative impacts to the learning outcome (Pashler *et al.*, 2009). According to Sadiman (2002), the precise and vary application of educational media is very useful to the students, because it helps improving the recognition and understanding toward the concept (Emda, 2011).

In plants concept, students are demanded to be able to classify the plants until "class" taxon level and define its "species". So far, students only deal with the explanation about plants to be known and classiffied, theoritically. It is hard for the students to understand the plant classification and they finally only memorize the taxon order of certain plants.

The proper learning approach for plants concept is contextual approach with field observation. Contextual approach is meant for students to be able to connect between knowledge concept in the subject and real situation (Saptasari, 2012). Mu'iz *et al*. (2013) stated that application of field learning by using surrounding environment can improve the students' activity and learning outcome. The application of Outdoor Learning Process helps students find concept and develop the ideas in form of group work and also scientific activity (Safitri *et al*., 2014). Field observation needs time, power, and high cost that hard to be applied. Teachers need to develop the alternative media which can support the learning process and outcome. Winarsih & Mulyani (2012) wrote that teacher who is professional and able to manage the learning process well has implication to the students' ability in constructing their knowledge and its use in daily life. This research aimed to develop the learning media such an album of seeds plant taxonomy in Linggo Asri forest to shift the field observation activity.

Seeds Plant Taxonomy Album was compiled from the field study in the Linggo Asri forest. This album contains photos, classification and description of plants and also glossary. The utilization of natural resource as learning source can improve activity, science process and attitude of the students in the learning of biology subject (Brahim, 2007; Nurmaliahayati, 2013; Pantiwati 2015). Seeds plant taxonomy album is a visual media which makes the learning more interesting and effective. According to Perwita (2015), the use of media with visual communicative design inside is more effective in the learning process of plant classification material.

Linggo Asri forest is located in the Kajen district, Pekalongan regency with height above 700 masl. Linggo Asri forest is a potential learning source outside the school for learning the plants . Plants in the Linggo Asri forest are natural and diverse so can be used as learning source of plants material.

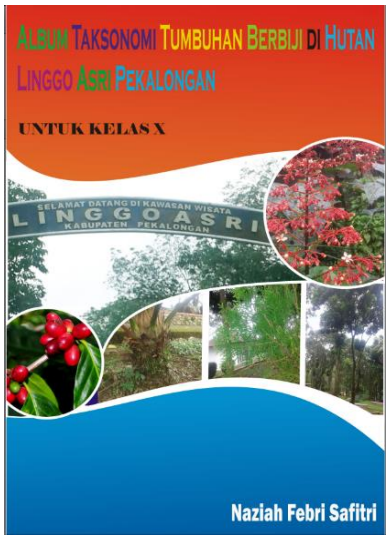
In the utilization of Linggo Asri forest as learning source is needed the media development of Linggo Asri Forest Seeds Plant Taxonomy Album. That media is effective to be applied in the biology learning process of plant materials.

RESEARCH METHOD

This study is a Research and Development (RnD). The research was conducted on July-September 2017. The study was done in : 1) Linggo Asri forest for collecting data to develop seeds plant taxonomy album, and 2) SMA N 1 Kajen for testing the product. Sample of the research data for making seeds plant taxonomy album was seed plants in the Linggo Asri forest which are trees and shrubs. Sample was taken using incidental sampling and identified by matching the picture with

the plants taxonomy expert. The sample for seeds plant taxonomy album testing were students of class X MIA 1 and X.MIA 2 in SMA N 1 Kajen. Testing of seeds plant taxonomy album in Lingo Asri forest was done by One Shot Case Study. The success indicator of this study were: 1) Seeds plant taxonomy album is proper if its final validity score reached ≥70 % with good into very good criteria, 2) It is effective if learning outcome of students who used the media pass the minimal mastery criteria or KKM (in Bahasa) (individual KKM ≥75 and class 75%). The taxonomic album of seed plants in Linggo Asri forest was validated by media experts and material experts before being tested in school. The album improvements show the following design changes.

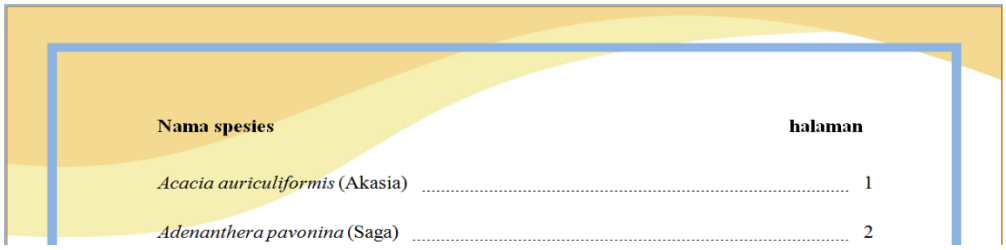
a. Cover



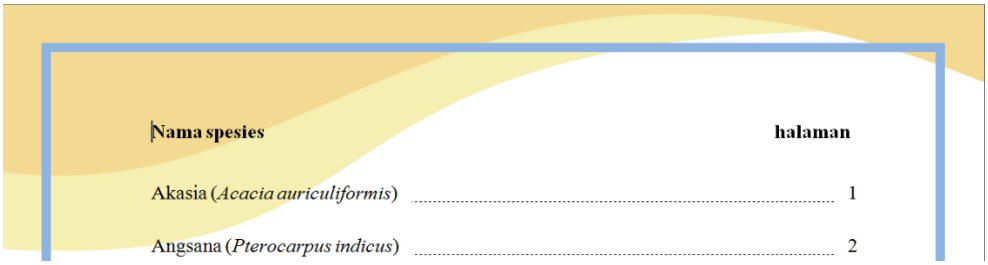
Before

After

b. Table of Contents



Before



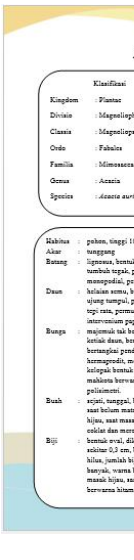
After

c. Background

Before

After

d. Position photo



After

e. Poster

Before

After

RESULT AND DISCUSSION

The results of the study include species data of seeds plants in the Linggo Asri forest and the properness as well as effectiveness of the Linggo Asri Forest Seeds Plant Taxonomy Album as learning media.

Species of Seeds Plants in the Linggo Asri forest

Based on the results of the study in the Linggo Asri forest, there were 51 species of seeds plants found in the forest. Those seeds plants include Gymnosperm and Angiosperm which are shrubs and trees. The list of the plants can be seen on Table 1.

Table 1. List of Seeds Plants Species in the Lingo Asri forest

No.	Scientific Name	Local Name	No.	Scientific Name	Local Name
1.	*Acacia auriculiformis*	Akasia	**26.**	*Swietenia mahagoni*	Mahoni
2.	*Pterocarpus indicus*	Angsana	**27.**	*Mangifera indica*	Mangga
3.	*Arenga pinnata*	Aren	**28.**	*Gnetum gnemon*	Melinjo
4.	*Rhododendron brachycarpum*	Azalea	**29.**	*Morinda citrifolia*	Mengkudu
5.	*Ficus benjamina*	Beringin	**30.**	*Azadirachta indica*	Mimba
6.	*Clerodendrum paniculatum*	Bunga pagoda	**31.**	*Ananas comosus*	Nanas
7.	*Durio zibethinus*	Durian	**32.**	*Costus speciosus*	Pacing
8.	*Syzygium cumini*	Duwet	**33.**	*Cycas rumphii*	Pakis Haji
9.	*Dioscorea hispida*	Gadung	**34.**	*Dypsis lutescens*	Palem Kuning
10.	*Justicia gendarussa*	Gandarusa	**35.**	*Carica papaya*	Pepaya
11.	*Polyalthia longifolia*	Glodokan	**36.**	*Pinus merkusii*	Pinus
12.	*Psidium guajava*	Jambu biji	**37.**	*Musa paradisiaca*	Pisang
13.	*Syzygium jambos*	Jambu mawar	**38.**	*Nephelium lappaceum*	Rambutan
14.	*Tectona grandis*	Jati	**39.**	*Adenanthera pavonina*	Saga
15.	*Archidendron pauciflorum*	Jengkol	**40.**	*Salacca edulis*	Salak
16.	*Theobroma cacao*	Kakao	**41.**	*Syzygium polyanthum*	Salam
17.	*Datura matel*	Kecubung	**42.**	*Melastoma malabathricum*	Senggani
18.	*Cocos nucifera*	Kelapa	**43.**	*Clerodendrum serratum*	Senggugu
19.	*Filicium decipiens*	Kerai payung	**44.**	*Falcataria moluccana*	Sengon
20.	*Muntingia calabura*	Kersen	**45.**	*Duranta erecta*	Sinyo nakal
21.	*Terminalia catappa*	Ketapang	**46.**	*Ixora grandiflora*	Soka
22.	*Coffea arabica*	Kopi	**47.**	*Artocarpus altilis*	Sukun
23.	*Alpinia galanga*	Lengkuas	**48.**	*Solanum torvum*	Takokak
24.	*Ficus racemosa*	Lo	**49.**	*Colocasia esculenta*	Talas
25.	*Macaranga bancana*	Mahang	**50.**	*Lantana camara*	Tembelekan
			51.	*Hibiscus tiliaceus*	Waru

Linggo Asri forest is located on 700 masl with rainfall 2421 mm/years. Research data of Eprilurahman *et al.* (2009) stated that temperature of Lingo Asri forest is about 17-22^{0}C. The geographic condition of Linggo Asri forest supports the growth of the seeds plant inside. This is in line with Hanum (2008) that tropic plants can grow better on temperature range 22^{0}C-35^{0}C, with rainfall 2000-3000 mm/years.

Gymnosperm and Angiosperm were found in the Lingo Asri forest. It is because many plants of those two classes can grow well in the tropical forest. Three species of Gymnosperm were found in Lingo Asri forest. They are *Gnetum gnemon, Cycas rumphii and Pinus merkusii.* The 48 of 51 species found in Lingo Asri forest were Angiosperm. So the forest is dominated by Angiosperm.

Seeds Plant Taxonomy Album

Seeds plant taxonomy album is a visual media which attaches plants stature picture, body parts of plants, classification, description and glossary. The loaded materials in the album are result of field study in the Linggo Asri forest. The result of the study is developed into visual media with the purpose to make contextual learning keep effective and efficient. Contextual media is very influential to the students' cognitive outcome (Nugroho *et al.*, 2013). Visual media from the field study result can help students to identify a plant. Result study of Agustina (2010) shows that learning process using visual media get higher learning outcome than without visual media.

According to the media expert suggestion, the album is printed in two forms. The one is album and the other is album book. The album is printed on Art Paper 150gr in A4 size and for the book and A3 for poster. The poster provides plants photos like in the book with bigger size but no classification and description detail. The poster aimed to maximize the function of media. As stated by Emda (2011), media can shorten the verbalism and stimulate students to think critically. Poster encouragds students to think critically by doing observation to the plant inside the poster. Therefore students were demanded to observe the plant before using the album book as learning source. Album book contains detail information which works as guidance for confirming the accuracy of observation result.

The display of Linggo Asri Forest Seeds Plant Taxonomy Album's cover has some pictures of plants found in the Linggo Asri forest. The display illustrates the area of Linggo Asri forest which has diversity of seeds plants inside. The color base of the cover is orange and blue. According to Monica & Luzar (2011), orange color aims to make students' attracting to learn the plants material inside. The blue color means to give calm effect for students during learning activity. Some people believe that they feel more productive in blue colored room (Monica & Luzar, 2011).

The colour of background on the album contents is plain white on the centre with orange for top edge and blue for the bottom. The middle side is using plain white colour for making pictures of the plants look clearer and not obscure with the background colour. According to Arsyad (2011), learning media should have good contras, focus with the focus area with clear detail, natural colour and realistic.

Photo of stature and body part of the plants are placed in line in the outer edge of the book. The purpose of this placement is to make students' observation easier. The album is completed with glossary. The glossary aimed to make students more understanding the terms in taxonomy and morphology.

The Appropriateness of Seeds Plant Taxonomy Album

The feasibility of Linggo Asri Forest Seeds Plant Taxonomy Album was assessed by media experts, material experts, teachers and students. The album validation results are presented in Tables 2 and 3.

Table 2. Validation of Seeds Plant Taxonomy Album by Media Expert

No.	Scoring	Score
1.	Display of Media Cover	3
2.	Media Design	3
3.	Picture Clearness	3
4.	Picture Size	4
5.	The Physical Efficiency of Media	4
6.	Photo Representativeness of Media	4
7.	Writing	4
8.	Language Principle	4
9.	Consistency of Material and Picture Placement	4
10	Content of Information	4
	Percentage	93%
	Criteria	Very Good

Table 3. Validation of Seeds Plant Taxonomy Album by Material Expert

No.	Scoring	Score
1.	Content of information	4
2.	Served material reflects the description of substance of materials in the syllabus	4
3.	The ability of substitute the concrete learning	3
4.	The term usage	3
5.	Glossary function	3
6.	The photo representativeness of materials	3
7.	Pictures support explanation of materials	4
8.	The diversity of seeds plants	4
9.	The writing of scientific name	4
10	The precise of identification	4
	Percentage	90%
	Criteria	Very Good

The results of the assessment of media and material experts indicate there were several points that need to be improved included the cover, background, photo layout, the name of the species on the table of contents, the accuracy of the material, and the writing of the glossary. In addition, based on the expert advice the album media printed in two forms of album posters and album books. Posters were used by students to observe plants and classify based on observable morphological features. Album books containing more detailed information served as guidelines for confirmation of the truth of student observations on posters. After the improvement, the Linggo Asri Forest Seeds Plant Taxonomy Album was declared appropriate to be applied to the study of plant material by media experts and material experts.

The feasibility of the seed plant taxonomy album could also be seen from the results of the questionnaire assessment of teacher and student responses. Results of teacher and student responses are presented in Table 4 and Table 5.

Table 4. Teacher Response to the Seeds Plant Taxonomy Album

No.	Scoring	score
1.	Display of Media Cover	4
2.	Content of Information	4
3.	Picture Clearness	3
4.	Writing	4
5.	The Physical Efficiency of Media	4
6.	The ability of substitute the concrete learning	3
7.	Pictures support explanation of materials	3
8.	The diversity of seeds plants	4
9.	Glossary function	4
10	Language Principle	4
	Percentage	93%
	Criteria	Very Good

Based on teachers' judgment, there were few shortcomings in the media. They were the size of the photo on the album book that was less large so some photos look less clear. This certainly affected the ability of the album in the replacement of concrete learning and the function of the photo in supporting the explanation of the material. However, based on teacher comments, procurement of album posters was helpful enough for students in the observation of plants. It is because of the size of the photos in the poster are larger than in the album book. According to Riyono & Retnoningsih (2015), the use of images in learning can motivate students and cause high students' curiosity to the presented image. Overall, the Linggo Asri Forest Seeds Plant Taxonomy Album was declared appropriate by teachers with very good criteria**.**

Table 5. Students Response to the Seeds Plant Taxonomy Album

No.	Scoring	score		average	criteria
		X. MIA 1	X. MIA 2		
1.	Display of Media Cover	93%	88%	91%	Very good
2.	Content of Information	96%	99%	98%	Very good
3.	Picture Clearness	87%	93%	90%	Very good
4.	Writing	97%	99%	98%	Very good
5.	The Physical Efficiency of Media	96%	96%	96%	Very good
6.	The ability of substitute the concrete learning	96%	86%	91%	Very good
7.	Pictures support explanation of materials	98%	96%	97%	Very good
8.	The diversity of seeds plants	100%	100%	100%	Very good
9.	Glossary function	93%	98%	96%	Very good
10	Language Principle	93%	95%	94%	Very good
	Percentage	95%	95%	95%	
	Criteria	Very good	Very good	Very good	

Based on the students' assessment, the taxonomy of seed plants was considered feasible to be used in the learning of plant material. The diversity of the seed plants featured in the taxonomy album of seed plants get maximum value because it presents a variety of seed plants from the Gymnosperm and Angiosperm groups. In the comments field, there were some things that were considered to be the lack of albums. They were the appearance of the cover that seemed too simple and the selection of some words in the glossary elaboration is still quite difficult to understand by

students. In general, the Linggo Asri Forest Seeds Plant Taxonomy Album was practicable to be used in biology material study because it obtained the average feasibility percentage of 92,75% with very good criteria.

The Effectiveness of Seeds Plant Taxonomy Album in the Learning Process

The results of the study of album effectiveness show that the Linggo Asri Forest Seeds Plant Taxonomy Album was effectively applied in the learning of plant material. The effectiveness of the album in the learning process can be seen from the high learning outcomes and the percentage of students' graduation. The average grade of student learning outcomes is presented in Table 6.

Table 6. Students' Learning Outcome

No.	Class	LDS	Post-test	Final Score	Criteria
1	X. MIA 1	81,97	80,74	81,15	Effective
2	X. MIA 2	83,76	77,94	79,88	Effective
	Average	82,87	79,34	80,52	Effective

The final score of the students' learning outcomes is the average of students' worksheet (LDS) and post-test scores with a ratio of 1: 2. The comparison shows that the post-test value contributes more. Although the average grade of LDS students class X.MIA 2 is higher than class X.MIA 1, the average grade end of grade X.MIA 2 remain lower than class X.MIA 1. This indicates that the ability of student's learning outcomes class X.MIA 1 is higher than X.MIA 2 individually. The LDS value is a group scores so the scores do not necessarily reflect individual students' abilities.

This study found that some students who had high enough LDS value yet the final score did not reach KKM because the post-test score was very low. This suggests that LDS scores do not necessarily reflect the individual student abilities because the score of LDS was influenced by the thinking skills of other students in a group work. Although some students had scores below the KKM, the average final grade of the two experimental classes reach 80.52 indicates that learning with the seed plant taxonomy album is effective. Media effectiveness is also determined by the percentage of students' graduation based on the completeness of student learning outcomes. Classical completeness of student learning outcomes is presented in Table 7.

Table 7. Classical Completeness of Students' Learning Outcome

No.	Class	Total Passed	Total not Passed	Passing Percentage
1	X MIA1	27	7	79,41%
2	X MIA 2	28	6	82,35%
Average		27,5	6,5	80,88%

The average percentage of students' graduation achieving 80.88% proves that learning using the Linggo Asri Forest Seeds Plant Taxonomy Album can meet even exceed the target percentage of determined graduation that was 75%. Although the mean of final grade of the two experimental classes is high, there are still some uncompleted students in the test for their learning outcomes. In class X.MIA 1 there were 7 out of 34 students who do not pass from KKM while in X.MIA 2 there were 6 of 34 students who did not pass from KKM. The overall percentage of students' graduation from the two experimental classes was 80.88%. The average percentage of students' graduation reaching 80.88% proves that the media can meet even exceed the target percentage of determined

graduation that is 75%. The unfinished student learning outcomes are influenced by several factors both from students and the environment. According to Suwardi (2012) student learning outcomes are influenced by several factors including.

1. Psychological factors of students (27.54%), which consist of difficulty doing tasks, learning score, student's talent, interest, readiness, and motivation.
2. Environmental factors of society (10.18%), which consist of friends, media, and liveliness of students in the organization.
3. School environmental factors (8.70%), which consist of school discipline, student relations with other students, and learning tools.
4. Supporting factors of learning (6.98%), which consist of homework and atmosphere at home.
5. Family environment factor (6.50%), which consist of family background and parent understanding.
6. School time factor (6.23%).

In this study there are several possible causes of non-completion of student learning outcomes, such as the students' concentration was not on learning, students' disinterest to the media and applied learning methods, the learning time that was done in the day made the students did not fully concentrate and have lost energy, learning using mobile phones allowed by the school cause students to abuse the policy to be active on social media. According Nurdayanti *et al.* (2012) interest or interest of students on learning is part of the learning outcomes and has an important role. The effectiveness of learning using the plant seeds taxonomy album can be explained through the description of student learning outcomes presented in Table 8.

Table 8. Description of Students' Learning Outcome

No	Class	Highest Score	Total	Mid-Score	Total	Lowest Score	Total
1.	X.MIA 1	93	2	83	1	55	1
2.	X.MIA 2	95	2	82	6	50	1

The effectiveness of learning using the seed plant taxonomy album is indicated by a moderately high mean value of each class. The middle value describes the student's ability of half the total number of students per class. The mean values of the two experimental classes were over 80 while the established KKM was 75. This result indicates that more than 50% of students' score above the established KKM and even the highest grade achieved by each grade reaches a very high score, 93, obtained 2 students class X.MIA 1 and the score of 95 obtained 2 students of class X.MIA 2. Although highest value of class X.MIA 2 is higher than class X.MIA 1, the average grade final grade X.MIA 1 is higher because the class' lowest score is 55 which is 5 points higher than X.MIA 2. Besides the acquisition of middle-grade, X.MIA 1 also gives an illustration that more X.MIA 1 students get the higher value than class X.MIA 2. It affects the high average grade of final grade X.MIA 1.

CONCLUSION

Division of seed plants found in the Lingo Asri forest were Geophyte, Cycadophyte and Coniferophyte which includes Gymnosperm and also Magnoliophyte which is Angiosperm. The

plants found consisted of 4 division, 5 classes, 21 order, 30 family and 51 species of seed plants dominated by Angiosperms. Linggo Asri Forest Seeds Plant Taxonomy Album is proper to be used as learning media for seeds plants concept with appropriateness of 92.75%. Linggo Asri Forest Seeds Plant Taxonomy Album is effective for plants material learning process. The students' learning outcome is high with final score average is 80.52 and students' passing percentage is 80.88%.

REFFERENCE

Agustina, L. 2010. Pengaruh Penggunaan Media Visual dan Minat Belajar Siswa terhadap Hasil Belajar Matematika. *Jurnal Formatif* 1(3): 236-246 ISSN: 2088-351X.

Arsyad, A. 2011. *Media Pembelajaran*. Jakarta: Rajawali Pers.

Brahim, K.T. 2007. Peningkatan Hasil Belajar Sains Siswa Kelas IV Sekolah Dasar melalui Pendekatan Pemanfaatan Sumber Daya Alam Hayati di Lingkungan Sekitar. *Jurnal Pendidikan Penabur*-No.09:42-48.

Emda, A. 2011. Pemanfaatan Media Dalam Pembelajaran Biologi Di Sekolah. Dalam *Jurnal Ilmiah DIDAKTIKA* VOL. XII NO. 1, 149-162.

Eprilurahman, R., M. F. Hilmy & T. F. Qurniawan. 2009. Studi Keanekaragaman Reptil dan Amfibi di Kawasan Ekowisata Linggo Asri, Pekalongan, Provinsi Jawa Tengah. *Journal of Biological Researches Berkala penelitian Hayati I5 (9-l-97). 2009.*

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

[Kemdikbud] Kementerian Pendidikan & Kebudayaan. 2014. *Laporan Hasil Ujian Nasional* 2014. Jakarta: Kementerian Pendidikan dan Kebudayaan.

_____. 2016. *Pemaparan Hasil Ujian Nasional Tahun 2016*. Jakarta: Kementerian Pendidikan dan Kebudayaan.

Monica & L. C. Luzar. 2011. Efek Warna dalam Dunia Desain dan Periklanan. *Jurnal HUMANIORA* Vol.2 No.2 Oktober 2011: 1084-1096.

Mu'iz, A., Parmin & E. Purwantoyo. 2013. Penerapan Model Studi Lapangan pada Materi Keanekaragaman Hayati dengan Memanfaatkan Lingkungan Sekolah. *Journal of Biology Education* 2 (3) (2013).

Nugroho, G.A., Lisdiana, & T. A. Pribadi. 2013. Pengembangan Komik Sains Berbasis Kontekstual pada Pembelajaran Sistem Pernapasan. *Unnes Journal of Biology Education 2* (2) (2013).

Nurdayanti, I., S.M.E. Susilowati, & S. Sukaesih. 2012. Pembelajaran Kooperatif Tipe Berpikir Berpasangan Berempat dengan Bantuan Catatan Terbimbing Materi Pengelolaan Lingkungan. *Unnes Journal of Biology Education* 1 (1) (2012) 60-65.

Nurmaliahayati. 2013. Pemanfaatan Hutan Melalui Pembelajaran Biologi Terintegrasi untuk Meningkatkan Keterampilan Proses Sains dan Sikap Ilmiah. *Jurnal Pengajaran MIPA*, Volume 18, Nomor 1, April 2013, hlm. 43-49.

Pantiwati, Y. 2015. Pemanfaatan Lingkungan Sekolah sebagai Sumber Belajar dalam Lesson Study untuk Meningkatkan Metakognitif. *Jurnal BIOEDUKATIKA* Vol. 3 No.1 ISSN: 2338-6630 Halaman 27-32.

Pashler, H., M. McDaniel, D. Rohrer & R. Bjork. 2009. Learning Styles Concepts and Evidence. *Journal of The Association for Psychological Science* Volume 9 Number 3.

Perwita, F. 2015. Pengembangan Katalog Tumbuhan sebagai Media Pembelajaran Biologi pada Materi Plantae di SMA N 7 Semarang *(Skripsi).* Semarang: Jurusan Biologi Fakultas MIPA Universitas Negeri Semarang.

Riyono, B. & 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.

Sadiman, A.K. 2002. *Media Pendidikan, Pengertian Pengembangan dan Pemanfaatannya*. Jakarta: Raja Grafindo Persada.

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

Saptasari, M. 2012. Pembelajaran Berbasis Kontekstual Sebagai Upaya Peningkatan Minat Mahasiswa pada Taksonomi Tumbuhan di Perguruan Tinggi. *Jurnal Pendidikan dan Pembelajaran*, volume 19, nomor 2, Oktober 2012.

Suwardi, D. R. 2012. Faktor-Faktor yang Mempengaruhi Hasil Belajar Siswa Kompetensi Dasar Ayat Jurnal Penyesuaian Mata Pelajaran Akuntansi Kelas XI IPS di SMA Negeri 1 Bae Kudus. *Economic Education Analysis Journal* 1 (2) (2012).

Widoyoko, E.P. 2009. *Evaluasi Program Pembelajaran*. Yogyakarta: Pustaka Pelajar.

Winarsih, A. & S. Mulyani. 2012. Peningkatan Profesionalisme Guru IPA melalui Lesson Study dalam Pengembangan Model Pembelajaran PBI. *Jurnal Pendidikan IPA Indonesia* JPII 1 (1) (2012) 43-50.