



The Development of Spermatophyte E-Catalog in Hutan Kota Salatiga as Learning Resource on Plantae Material for Senior High School Students

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Abstract

This study aims to identify species richness of spermatophytes in Hutan Kota Salatiga, develop the e-catalog, analyze the validity, readability, and effectiveness of spermatophyte e-catalog as a learning resource on plantae material for senior high school students. The research method used in this study is Research and Development (R&D). The spermatophyte e-catalog was validated by media and material expert. Small-scale trials were used to test the readability and effectiveness of the product. The readability test involved one biology teacher and 10 students from class X MIPA 1, while the effectiveness test involved 20 students from class X MIPA 1. Both data validity, readability, and effectiveness were analyzed by descriptive percentage. The results of plant exploration show that there are 58 spermatophyte species in the Hutan Kota Salatiga. The validity of spermatophyte e-catalog obtained score 91.25% from material expert and 95.83% from media expert, with very valid criteria. The readability of spermatophyte e-catalog obtained score 85% from biology teacher and 89.83% from students, with very good criteria. The results of the effectiveness test show that spermatophyte e-catalog was effectively used as a learning resource with score of the classical completeness criteria reaches 95%. Based on the results of this study, it can be concluded that the Spermatophyte E-Catalog of Hutan Kota Salatiga feasible and effective to be used as a learning resource on plantae material for senior high school students.

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INTRODUCTION

Each region has potency that can be utilized as a learning resource. One of the places in Salatiga City that can be used as a learning resource is the Hutan Kota Salatiga (urban forest). This forest area has various types of plants that students can use to increase their knowledge about the diversity of plant species. Based on the initial observations, it is known that in the Hutan Kota Salatiga there are 58 species of spermatophyte. This can be utilized to achieve basic competencies of plantae material, especially spermatophyte sub-material for senior high school students. Optimization of learning objectives can be improved if teachers utilize the diversity of plants in the environment (Emda, 2011). Studying plant diversity directly from nature can improve student's understanding of plant material concepts. Out-of-class learning activities focused on studying plants have a significant influence on student's attitudes and knowledge of plants (Fancovicova & Prokop, 2011).

The strategic location of Hutan Kota Salatiga makes it easy for teachers and students from various schools in the Salatiga area to carry out learning in this area. However, in reality, Hutan Kota Salatiga has not been utilized as a source of learning. There are a variety of factors that cause teachers to be less interested in carrying out learning outside the classroom, such as limited lesson hours, distance, and expensive costs. Also, learning objectives are often not achieved because students are less serious during learning activities outside the classroom (Ramadhan & Aminatun, 2019).

Utilization of the environment or local potential as a learning resource can be done by integrating local potential into learning tools so that the materials taught can be following the daily lives of students (Rimbun & Sriyati, 2018). Integrated local potential into the learning tools can be a good learning resource for students as the learning process becomes more meaningful and students are easier to understand the material. Besides, the integration of local potential into learning activities can also realize more active learning activities (Haryanto & Wulandari, 2019). The integration of local potential into learning tools can be an innovation in classroom learning activities so that students get new experiences that can increase student's learning interests.

Along with the advancement of information and communication technology (TIK), innovation of learning resources, learning media, and electronic-based teaching materials are increasingly being developed. Products such as electronic school books, electronic modules, and electronic catalogs are widely developed as additional learning resources for students. Optimal use of TIK can improve the effectiveness of learning activities in schools (Hanum, 2013). An electronic catalog or e-catalog is an innovation of a print catalog that can be accessed on various electronic devices such as mobile phones, laptops, and computers. E-catalog has several advantages compared to print catalogs, among which can be used anywhere and anytime, and has a paperless concept. Interesting colored images and information describing images in detail allow students to understand the information on the e-catalog more easily. E-catalogs are also easy to use by students, thus supporting students to learn independently.

Based on the results of interviews with biology teachers, problems in plantae material learning activities in the classroom, namely, students still have difficulty distinguishing and classify the types of plants. Students also prefer to memorize the material than understand the basic concepts of plantae material. Students are less actively involved in learning because in classroom learning activities teachers use more the lectures, presentations, and discussions method. Learning by traditional methods makes teachers often weak when teach plant material concepts to students. Students also have not been able to use the plants in their surroundings as an alternative learning resource. Based on the research background, research needs to identify the species richness of spermatophyte in Hutan Kota Salatiga and the development of spermatophyte e-catalog as a source of learning plantae material that presents species of spermatophyte in Hutan Kota Salatiga.

RESEARCH METHOD

This research design was applied modification of the Research and Development (R&D) research method from Sugiyono (2010). Exploration and identification of spermatophyte were conducted in the Hutan Kota Salatiga. The validation of the e-catalog was conducted at Semarang State University involving material experts and media experts. The trials of e-catalog products in this study implemented small-scale trials, which included readability tests and e-catalog effectiveness tests. The spermatophyte e-catalog readability trial involved 10 students from class X MIPA 1 and one biology teacher of MAN Salatiga. While the test of the effectiveness of spermatophyte e-catalog products involved 20 students from class X MIPA 1 at MAN Salatiga. The research was conducted from February 2020 until March 2021.

The data collected in this study are data on species richness of spermatophyte in Hutan Kota Salatiga, data on characteristics of spermatophyte e-catalog, and data on validity, readability, and effectiveness of spermatophyte e-catalog. Data species richness of spermatophyte collected by observation and exploration methods in the Hutan Kota Salatiga. The characteristic data of the e-catalog obtained by describing the product of the spermatophyte e-catalog. Data on the validity of e-catalogs collected by questionnaire methods involved material experts and media experts. Data collection of e-catalog readability was done by questionnaire method involved biology teacher and X grade students at MAN Salatiga. Meanwhile, data on the effectiveness of e-catalogs obtained based on test scores and LKPD scores. Both validity data, readability, and effectiveness of e-catalog are analyzed descriptively percentage.

RESULTS AND DISCUSSION

Species Richness of Spermatophytes in Hutan Kota Salatiga

Exploration and identification of Spermatophytes in Hutan Kota Salatiga found 58 spermatophytes species, divided into 2 divisions, 3 classes, 26 orders, 36 families, and 53 genera. These spermatophytes consist of herbs, shrubs, and trees, grow in the area two meters from the footpath at Hutan Kota Salatiga. There are 56 species that were found are Angiospermae, while two other species are Gymnospermae.

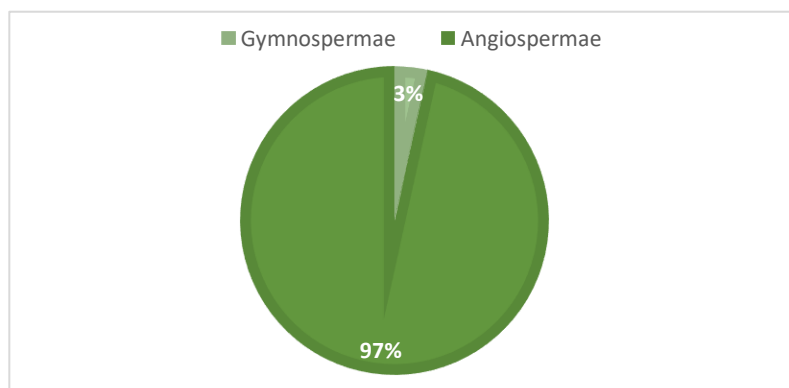


Figure 1 The Comparison of Gymnospermae dan Angiospermae Species in Hutan Kota Salatiga

The dominance of Angiospermae species in Hutan Kota Salatiga is affected by the differences in life cycles and how the seeds of both plants are spread. In its, life cycle, Gymnospermae pollination only through wind drafts and from the pollination until fertilization takes over a year. The spreading of Gymnospermae seeds also mediated by the wind. Meanwhile, Angiospermae pollination can occur in a variety of ways, and from the pollination stage until fertilization takes a shorter time. The spreading of Angiospermae seed can occur through many pollinators, such as wind, animals, and humans (Campbell *et.al*, 2008).

Characteristic of Spermatophyte E-Catalog of Hutan Kota Salatiga

Spermatophyta e-catalog in Hutan Kota Salatiga is a source of learning material plantae for students of grade X SMA MA, which is designed and compiled based on the basic competencies of plantae material. The cover page of the e-catalog is made interesting so that students are interested in reading and learning the material contained in the e-catalog. In the contents of the e-catalog is presented information on species of spermatophytes found in the Hutan Kota Salatiga, which includes scientific names, local names, classifications, photos of plants (habitus, vegetative organs, and generative), descriptions, and the benefits of plants for life. Photos or pictures of plants are an important component in a plant catalog because they can increase the attractiveness of the catalog. Photos also increase understanding, strengthen memory, and increase student's interest in learning a material (Musfiqon, 2012).



Figure 2 Cover of Spermatophyte E-Catalog of Hutan Kota Salatiga

Besides presenting information on the species of spermatophyte in the Hutan Kota Salatiga, the spermatophyte e-catalog is also equipped with material of plant phylogeny, Student Worksheets (LKPD), and spermatophyte exercises. Phylogeny material is often minimized or not taught by teachers, although this material is important to increase student's analytical skills, especially about plant evolution (Bokor et.al, 2014). This can be due to a variety of factors, such as the teacher's lack of understanding of plant phylogeny materials and the limited media or learning resources of plant phylogeny. The Spermatophyte E-Catalog in Hutan Kota Salatiga is equipped with plant phylogeny material presented in detail and concisely, making it easier for students to understand, analyze, and describe a plant phylogeny tree. LKPD and exercises in the spermatophyte e-catalog can be used to evaluate student's ability to understand spermatophyte material. LKPD and exercise can increase student learning activities so that students can learn more actively (Marsa et.al, 2016). Exercise or test also make students more challenged and motivated to understand the material so that the level of understanding of student material concepts can increase (Yustika, 2018).

Validity of Spermatophyte E-Catalog of Hutan Kota Salatiga

The standard used as the basis for e-catalog validation is the 2016 BSNP teaching material eligibility standard, which consists of four components, namely content feasibility, language, graphic, and presentation components. Based on the results of the validity test, it is known that the validity of spermatophyte e-catalog belongs to the very valid category, with the percentage of validity of spermatophyte e-catalog according to the material expert is 91.25% and according to media experts by 95.83%. While the percentage of each aspect of the assessment of the validity of the e-catalog is presented in the following figure.

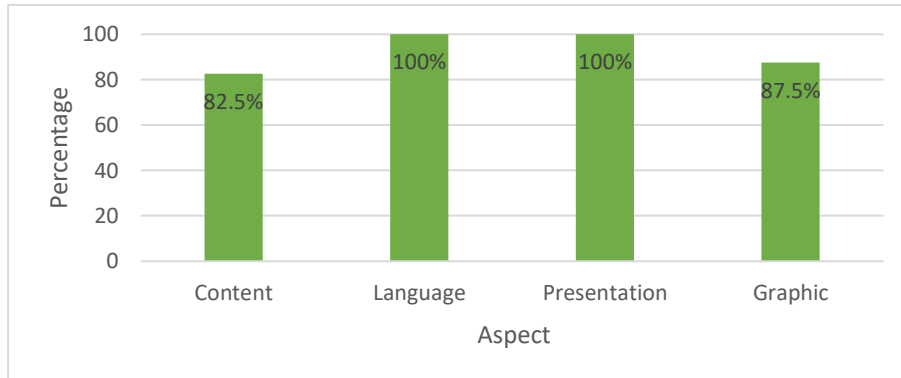


Figure 3 Percentage of Validity Aspects of Spermatophyte E-Catalog

Based on Figure 3, the feasibility aspect of spermatophyte e-catalog content according to material experts gets a percentage of 82.5%. The information presented in the Spermatophyte E-Catalog in Hutan Kota Salatiga was adjusted to the basic competencies and describes the substance of the material on the syllabus. This correspond to the standards of eligibility of the contents of books or teaching materials set by BSNP, which explains that materials in a teaching material should be able to help achieve basic competencies of the materials. As for the language aspect, both based on the assessment of material experts and media experts got a percentage of 100%, which can be described that the sentences in the e-catalog have clear punctuation and use the right spelling, and do not ambiguous. Due to the language eligibility standards according to BSNP, good teaching materials must use clear, communicative, and following PUEBI (Indonesian language rules). Based on the validation results by media experts, the feasibility aspect of presenting the spermatophyte e-catalog got a 100% percentage. Presentation of spermatophyte species material and information in the form of e-catalogue spermatophyte makes it easy for students to use the learning resource anywhere and anytime independently. This correspond to the feasibility component of the presentation of teaching materials according to the BSNP, where the presentation of materials in the teaching materials should be able to support students to learn independently and more actively. The graphic aspect of the spermatophyte e-catalog according to media experts earned a percentage of 87.5%. The correction given by media experts was need to change the design of e-catalog, also the type and color of the letters used so as it is not monotonous and more interesting.

Readability of Spermatophyte E-Catalog of Hutan Kota Salatiga

The readability test of the spermatophyte e-catalog involved one biology teacher and 10 students from class X MIPA 1. Based on the readability test result, the readability level of spermatophyte e-catalog was very good, with a readability percentage 85% from the teacher and 89.83% from students. Recapitulation of the student's readability test results can be seen in the following table.

Table 1 Result of Student Readability

No	Student code	Score	Percentage	Criteria
1	A	50	91.67%	Very good
2	B	54	90%	Very good
3	C	52	86.67%	Very good
4	D	54	90%	Very good
5	E	52	86.67%	Very good
6	F	60	100%	Very good
7	G	57	95%	Very good
8	H	49	81.67%	Very good
9	I	60	100%	Very good
10	J	46	76.67%	Good
Average		53.9	89.83%	Very good

Differences in student readability results as shown in Table 1 can be caused by differences in student's abilities in understanding the material presented in the e-catalog. The lowest percentage of readability was obtained based on the responses of student with student code J, which was student with low cognitive abilities. Although the student's readability showed different results, overall, the readability of spermatophyte e-catalog was very good. Based on the result of spermatophyte e-catalog readability, it can be described that the type, size, and color of the letters used are appropriate. Language and terms used in the e-catalog are easy to understand, and there are no many typing errors (typo) so the students have no difficulty when using the spermatophyte e-catalog independently. The material presented in the spermatophyte e-catalog is adjusted to the basic competencies of the plantae material, so it can help students to achieve learning objectives. The material is presented attractively and equipped with images that can increase student's motivation to study spermatophyte material. A good e-catalog not only contains complete and appropriate material but also have a good level of readability. The readability of a learning medium is not only important to improve student's understanding of the material presented, but it can also increase the motivation and interest of students to read it. Learning resources that are difficult to read or have low readability can hinder student's learning ability because the learning resource makes students's learning motivations drop (Sari, 2020).

Effectiveness of Spermatophyte E-Catalog of Hutan Kota Salatiga

Analysis results of student's learning outcomes show that 19 from 20 students passed the minimum completeness criteria (KKM), so the classical completeness criteria were 95%, which means that the Spermatophyte E-Catalog of Hutan Kota Salatiga is effective to use as a learning resource. Based on the final score, it is known that one student with low ability criteria didn't pass the KKM. Meanwhile, students who are included in the medium and high criteria are passed the KKM. The differences in student's learning outcomes are affected by many factors, such as the differences in student's ability to understanding the material and student's motivation (Steinmayr, *et. al*, 2019).

Choosing the right learning resources is very important to support the learning process so the learning objectives can be achieved (Supriadi, 2015). Learning resources also can improve student's motivation and support students to be able to learn actively and independently. The Spermatophyte E-Catalog of Hutan Kota Salatiga presents the information of spermatophytes species involve name, classification, description, and the benefits of plants, which has been adjusted to the learning objectives of the plantae material. The information of the spermatophytes also equipped with photos of plant organs that can increase student's understanding of morphological differences between one spermatophyte species and another. The material and design of the e-catalog are made attractive to increase student motivation. Therefore, the Spermatophyte E-Catalog of Hutan Kota Salatiga feasible and effective to be used as a learning resource on Plantae material.

CONCLUSION

Based on the results and discussion, it can be concluded that there are 58 spermatophyte species in the Hutan Kota Salatiga. E-catalog contains the information of spermatophyte species in Hutan Kota Salatiga, plant phylogeny material, LKPD, and spermatophyte questions. Spermatophyte E-Catalog in Hutan Kota Salatiga feasible and effective to be used as a learning resource on plantae material for senior high school students, with very valid criteria according to material and media validator, very good readability according to biology teacher and students, and the effectiveness passed the classical completeness criteria.

REFERENCES

- Bokor, J.R., Landis, J. B., & Crippen, K. J. (2014). High School Student's Learning and Perceptions of Phylogenetics of Flowering Plants. *CBE-Life Sciences Education*. 13, 653-665.
- Campbell, N. A., & Reece, J. B. (2008). *Biology Ed. 8*. Jakarta: Erlangga.
- Emda, A. (2011). Pemanfaatan Media dalam Pembelajaran Biologi di Sekolah. *Jurnal Ilmiah Didaktia*. 12(1), 149-162.
- Fancovicova, J., & Prokop, P. (2011). Plants have a chance : outdoor educational programmes alter students ' knowledge and attitudes towards plants. *Environmental Education Research*. 17(4), 537-551.
- Hanum, N.S. (2013). Keefektifan E-Learning Sebagai Media Pembelajaran (Studi Evaluasi Model Pembelajaran E-Learning SMK Telkom Sandhy Putra Purwokerto). *Jurnal Pendidikan Vokasi*. 3(1), 90-102
- Haryanto, R., & Wulandari, S. (2019). Development Potential of Teaching Materials for Environmental Education Based on Local Potentials of Riau Province in Higher Education. *Journal of Environmental and Earth Science*. 9(6), 131-138.
- Marsa, Y.H., & Taiyeb, A. M. (2016). Pengaruh Penggunaan Lembar Kerja Peserta Didik Berbasis Pendekatan Ilmiah Terhadap Aktivitas dan Hasil Belajar IPA Biologi Kelas VII Peserta Didik SMP Negeri 2 Watampone. *Jurnal Sainsmat*. 5(1), 42-57.
- Musfiqon. (2012). *Pengembangan Media dan Sumber Pembelajaran*. Jakarta: Prestasi Pustaka.
- Ramadhan, A., & Aminatun, T. (2019). Efektivitas Model Pembelajaran Auditory Intellectually Repetition Dipadu Media Video terhadap Minat Belajar Siswa. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*. 4(3), 407-413.
- Rimbun, W., & Sriyati, S. (2018). The importance of teaching materials based local potential mangrove ecosystems : introduction study. *Dalam: International Conference on Mathematics and Science Education of UPI*. 3, 7-11. Bandung.
- Sari, R. K. (2020). The Assessment of The Readability of English Junior high School Textbooks by Implementing Cloze Procedure. *Journal of English Language Teaching*. 4(2), 101-105.
- Steinmayr, R., Weidinger, A. F., Schwinger, M. & Spinath, B. (2019). The Importance of Students' Motivation for Their Academic Achievement – Replicating and Extending Previous Findings. *Frontiers in Psychology*. 10(1730), 1-10
- Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Supriadi. (2015). Pemanfaatan Sumber Belajar dalam Proses Pembelajaran. *Lantanida Journal*. 3(2), 127-138.
- Yustika, G.P. (2018). Pembelajaran Biologi Melalui Latihan Soal Pilihan Ganda untuk Siswa SMA. *JURNAL PENGABDIAN PADA MASYARAKAT*. 3(1), 7-14.