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Development Ecosystem E-Booklet in Karimunjawa National Park as a Supplement to Teaching Materials to Improve Learning Outcomes of SMA N 1 Donorojo Students

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Abstract

Karimunjawa National Park is a conservation area in the northern part of the Java Seawhich has 5 types of ecosystem. This research aims to conduct research for materials for developing ecosystem e-booklets in Karimunjawa National Park as a supplement to teaching materials and test the validity, readability and effectiveness of e-booklets to improve student learning outcomes. This research is a type of research and development or R&D (research and development). The development procedure used in developing this e-booklet is the ADDIE model (Analyze, Design, Develop, Implement, Evaluate). The biological research method used is pure descriptive research or survey by conducting explorationField data collection in Karimunjawa National Park, Design*e-booklet*which has been valid after being revised based on validator input and high readability, then tested for effectiveness. Testing the effectiveness of the e-booklet was carried out on cognitive, affective and psychomotor aspects using post-test question instruments, attitude assessment questionnaires and LKPD. The effectiveness test was carried out on 33 class X students. The results of the research showed that the ecosystem in Karimunjawa National Park was in good condition with diverse flora and fauna. The ecosystem e-booklet in Karimunjawa National Park is very suitable, has high readability, and is effective for improving learning outcomes in cognitive, affective and psychomotor aspects. Based on the research results, it can be concluded that the ecosystem e-booklet in Karimunjawa National Park as a supplement to teaching materials is effective in improving the learning outcomes of students at SMA Negeri 1 Donorojo.

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INTRODUCTION

Karimunjawa National Park is a conservation area in the northern part of the Java Sea with an area of 111.625 ha. Ecosystem types in this area include lowland tropical rain forests, coastal forests, mangroves, coral reefs and seagrass beds. The Karimunjawa Islands consist of 27 islands. Administratively, these islands are part of Karimunjawa District, Jepara Regency, Central Java Province. The population reaches 9.784 people living on five main islands, namely Karimunjawa Island, Kemujan Island, Parang Island, Mosquito Island and Genting Island (Limaryadi & Sumaryati, 2021).

Ecosystem diversity can be used as a factual and contextual learning medium. The existence of this ecosystem is very important to maintain the stability of the hydrological system and microclimate of the Karimunjawa Islands. The loss or damage to one existing ecosystem causes an imbalance in the functions of other ecosystems (Karimunjawa, 2011).

Ecosystem material is one of the materials presented in phase E or class Therefore, the learning objectives in this ecosystem material are structured, namely: (1) identifying ecosystem components by presenting reports on ecosystem observations, (2) analyzing interactions that occur between ecosystem components by presenting observation data, and (3) proposing solutions to ecosystem problems.

The independent curriculum demands that learning is no longer centered on teachers (teacher centered learning) but is centered on students (student centered learning). The teacher here acts as a facilitator, so that the students themselves are required to always be active in learning. Student centered learning trains students to be able to interpret their knowledge independently, so that students can be more active in learning, and can train students to think critically every time they encounter a problem in order to find a solution to the existing problem.

Results Interviews with biology teachers and several class Apart from that, exploration activities in the surrounding environment are only carried out in the rice field ecosystem which is located close to the school. The use of teaching materials and learning resources still makes it difficult for students to master the concept of material, especially ecosystem material.

Mastery of concepts is very important for students to understand and comprehend the material being studied, implement the material that has been studied, and solve a problem related to the material being studied. Apart from that, learning resources that are less contextual also make it difficult for students to understand the material. Contextual learning resources can better help students understand the material because students can learn the material directly through real situations around the students. Students can also easily connect the concepts they have learned with existing facts found in the environment around them. Therefore, other learning resources are needed that can complement teaching materials and can represent real ecosystem material, so that students can master the material well. Good mastery of the material can help in the learning process so that learning objectives can be achieved and learning results are optimal. One practical teaching material to bring is an e-booklet.

Booklets is a small book, with a shape, size and pages that are smaller and fewer than books in general which have many pages. Booklets can be used as small story books, instructor manuals, recipe books, health books, catalogs, etc. The paper sizes used in preparing booklets vary, but most are A5, A4 and A3 sizes (Rustan, 2009). E-booklets were developed into electronic or digital based booklets with the help of a number of supporting software (Sarip et al., 2022).The informative nature of e-booklets and their attractive designs can arouse students curiosity. Apart from that, presenting material through pictures also

makes it easier for students to remember and understand biological material, especially ecosystem material.

Study Laela Noor Fa'izah, Ning Setiati and Nana Kariada Tri Martuti (2023) show that *e-booklet* valid and suitable for use based on the assessment of material experts and media experts, and effective for use in learning. Similar research was carried out Indun Nursafitri, Bunda Halang, Aulia Ajizah (2022) shows that e-booklets very suitable for use as biology teaching materials with very good readability which means e-booklet very easy for students to read. Research Hanifah, Triasiningrum Afrikani and Indri Yani (2020) show that e-booklet effective in improving student learning outcomes, because e-booklets are presented in an attractive manner with little description and lots of pictures and colors that are more attractive to students. Images can increase reading interest because they can help readers to imagine. Imagination can improve a person's memory performance.

Based on the description above, E-booklet Ecosystems in Karimunjawa National Park as a Supplement to Teaching Materials to Improve Student Learning Outcomes. The aim of this research is to develop an ecosystem e-booklet in Karimunjawa National Park as a supplement to teaching materials based on research results, and to test the effectiveness of the ecosystem e-booklet in Karimunjawa National Park as a supplement to teaching materials on ecosystem material to improve student learning outcomes.

RESEARCH METHOD

Research design is a type of research and development or R&D (research and development). The R&D method is a research method used to create a particular product and test the feasibility and effectiveness of the product being developed. The development procedure used in developing this e-booklet is the ADDIE model (Analyze, Design, Develop, Implement, Evaluate). The biological research method used to obtain field data in Karimunjawa National Park as material for developing e-booklets is pure descriptive research or surveys. The method for collecting data regarding ecosystem conditions in Karimunjawa National Park is carried out through exploration activities at several predetermined locations.

Drafting e-booklet and validation by experts was carried out at Semarang State University. Readability testing is carried out on a small scale with students. The effectiveness of e-booklets was tested on a large scale in class X SMA N 1 Donorojo. Field data collection and product testing in schools will be carried out in May 2023 – September 2023.

The results of the validation of the e-booklet research results were carried out by media experts and material experts, by using a validity questionnaire. The scores that have been obtained are then averaged and converted into 5 category scores based on Arikunto (2010), from very good to very poor. The e-booklet indicator is suitable to be used as a learning resource if there are no more revised parts, namely at least in the good category.

The text readability test in the e-booklet was analyzed using a cloze test (testhiatus). The gap test in this research functions as a readability measurement tool. The e-booklet readability test uses a cross-sectional test with a small sample carried out during a small-scale trial. Small-scale trials were carried out on 9 class X students, 3 students each with high, medium and low abilities. The categories for achieving e-booklet readability based on the cloze test according to Rankin & Culhane (1969) consist of 3 categories, namely high, medium and low. The e-booklet indicator is worthy of being used as a learning resource if the readability level is high.

Test the effectiveness of the booklet with a post test question instrument for cognitive aspects, a questionnaire assessing students' attitudes for affective aspects, and LKPD for psychomotor aspects. The effectiveness test was carried out on 33 class The indicator that

an e-booklet is suitable and effective as a learning resource is if the percentage of classical completion is > 80%.

RESULTS AND DISCUSSION

Based on research results in the Karimunjawa National Park area, there are 5 types of ecosystems which include tropical rainforest ecosystems, coastal forest ecosystems, mangrove ecosystems, coral reef ecosystems and seagrass ecosystems. So far each ecosystem is in good condition with a variety of flora and fauna. In each ecosystem, the biotic, abiotic components and interactions that occur within it are observed and documented. The documentation results are used as material for development e-booklet.

E-booklet contains the results of ecosystem research adapted to class. The e-booklet product also contains research results in the form of photos of ecosystems and ecosystem components which are equipped with descriptions and additional information regarding the scientific names of the various species found. Apart from containing all material related to ecosystems, the e-booklet is also equipped with For Your Information which contains several interesting facts related to Karimunjawa National Park and there is a LKPD that can be used to increase students understanding of ecosystem material.

Validation of the e-booklet was carried out by material experts and media experts. As a result of material validation, we received input that writing scientific names should be given more attention, references need to be completed, and writing personal sources should be written by including the author's clear name. The components assessed in assessing the appropriateness of the material include the dimensions of knowledge, language, presentation techniques and completeness of presentation. The overall results of material validation by material experts obtained a percentage of 93.75%, which shows that the material in the e-booklet is included in the very good category.

The results of the validation of the e-booklet media can be described that the writing of personal documentation sources is changed to the author's last name followed by the year of writing, and sentences with rather long descriptions are better colored or bolded or key words can also be underlined to make them easier to remember. learners. The components assessed in the media suitability assessment include the size of the e-booklet, the e-booklet cover design, and the e-booklet content design. The overall results of media validation by media experts obtained a percentage of 93.75%, which shows that e-booklet media is included in the very good category.

Based on validation results from media experts and material experts, it shows that the e-booklet is valid and suitable for use in teaching and learning activities, especially for ecosystem material. This is in line with opinion This is in line with opinionFa'izah et al. (2023) that e-booklet valid and suitable for use based on the assessment of material experts and media experts, and effective for use in learning. Yusuf et al. (2023) also stated that valid e-booklets can be used in learning activities after several revisions based on criticism and suggestions from the validator. According to Dewi and Wahyuningsih (2020), e-booklet material is said to be valid if it contains various information that suits students' needs and can increase students knowledge.

The readability of the e-booklet was tested in a small-scale trial using a readability questionnaire with a cloze test on 9 students. The cross-sectional test results show that the average percentage obtained is 96.8% in the high category.

E-booklet created can be used for all students, both those with high abilities and those with low abilities, because the e-booklet is made very interesting, easy to read, easy to understand, easy to use, and the language used is simple and helps to make it easier for

students to learn, especially in ecosystem material. This is in line with the opinion of Nursafitri et al. (2022) which states that e-booklets it is very suitable for use as Biology teaching materials and the readability is very good, which means it is very easy for students to read. Research by Himala et al. (2016) also stated that high readability test results indicate that the e-booklet is increasingly easy to understand, whereas low readability test results indicate that the e-booklet is increasingly difficult to understand.

The effectiveness of the e-booklet was tested in a large-scale test using one class X at SMA 1 Donorojo. The effectiveness of the e-booklet was measured in three aspects, namely, cognitive, affective and psychomotor. Cognitive aspects are assessed using a post test that has been carried out. The results of classical completion can be seen in the following table.

Table 1. Calcical Completeness from Post test Results

Information	Class X1
Number of students who completed	30
Number of students who did not complete	3
Classical Completeness (%)	91%

Based on the results of the posttest, students' classical completeness was calculated with a KKM of 78. There were 30 students who completed it and 3 students who did not complete it. So overall the students' classical completeness reached 91%. The results of the attitude assessment questionnaire showed that 61% of students got very good scores and 39% of students got good scores.

Affective aspects were assessed using a questionnaire assessing students' attitudes. The results of the student attitude assessment questionnaire can be seen in the following table.

Table 2. Student Attitude Assessment Questionnaire

No	Value Range	Amount	Percentage	Category
1.	85 < P < 100	20	61%	Very good
2.	70 < P < 85	13	39%	Good
3.	55 < P < 70	0	0%	Enough
4.	40 < P < 55	0	0%	Not enough
5.	25 < P < 40	0	0%	Very less

The results of the assessment of students' attitudes showed that 61% of students got a score between 86-100 in the very good category and 39% of students got a score between 71-85 in the good category.

Psychomotor aspects are assessed using the completed LKPD. The results of the student LKPD assessment can be seen in the following table.

Table 3. LKPD Assessment Results

No	Value Range	Amount	Percentage	Category
1.	91 – 100	21	64%	Very good
2.	81 – 90	6	18%	Good
3.	71 – 80	6	18%	Enough
4.	61 – 70	0	0%	Not enough
5.	≥60	0	0%	Very less

The results of the LKPD showed that 64% of students got a score between 91-100 in the very good category, 18% of students got a score between 81-90 in the good category, and another 18% of students got a score between 71-80 in the fair category. This shows that the majority of participants got scores above the average and experienced an increase in their learning outcomes. So, it can be said that the e-booklet is effectively used as a supplement to teaching materials on ecosystem material.

Attractive e-booklet designs, informative material, and the availability of e-booklets in flipbook form that can be accessed online make the learning process less monotonous and more varied so as to improve student learning outcomes. This is in line with opinionHanifah et al. (2020)which states that e-booklets are effective in improving student learning outcomes, because e-booklets have an attractive appearance dominated by images and colors that are attractive to students. Research by Lingga & Silitonga (2022) shows that e-booklets are more effective to use compared to other media because they can improve student learning outcomes higher than KKM. Violla and Fernandes (2021) stated that e-booklets are effective to use becauseequipped with concise and systematic explanations, as well as illustrations that help students understand the concepts and facts of a material, this can make it easier for students in the learning process.

CONCLUSION

The results of the research concluded that in Karimunjawa National Park there are 5 types of ecosystems in good condition and there are a variety of flora and fauna that are used ase-booklet development materials. The ecosystem e-booklet in Karimunjawa National Park is very suitable, has high readability, and is effective for improving cognitive learning outcomes in the high category, as well as attitudes and problem-solving skills for ecosystem material in students at SMA N 1 Donorojo Jepara.

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