Development of a Gastropod Diversity E-booklet as a Learning Media for High School Students

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Abstract

The study of Gastropod diversity in Cibuaya is very important, since Gastropods are the most important organisms in the food chain in aquatic ecosystems. To understand Gastropods, students need electronically supported learning aids in the form of e-booklet. One of the very important roles of e-booklets students can access e-booklets anytime, anywhere on their devices. The aim of this research is to develop a research-based electronic booklet for the identification of gastropod diversity, based on the findings from the identification of gastropods at Cibuaya Beach, Sukabumi. The development method used in this research is the 4-D model, which includes definition, design, development, and dissemination. This research was realized by developing the research results into an electronic brochure on gastropod diversity at Cibuaya Beach, Ujung Genteng, Sukabumi. Validation of the e-booklet was carried out by three Lecturers who were experts in material content, language, and media, and three Biology teachers to validate regarding the content of the material which is adapted to the material at school . The results of the validation test produced an average score of 86%. This score indicates that the E-booklet learning support falls into the very viable category and can be used in learning activities.

Keywords: e-booklets; education; learning media

INTRODUCTION

The government has proposed the 2013 curriculum for schools. This curriculum emphasizes learning through practical applications in daily life. Teaching materials play a crucial role in supporting the successful implementation of the 2013 curriculum. Learning media are defined as tools or instruments used to deliver material or content. These media can stimulate students' cognitive engagement during the learning process. As a result, they help ensure that teaching and learning activities run effectively. Moreover, learning objectives can be achieved more optimally with the support of appropriate media (Aprijal *et al*., 2020; Gultom *et al*., 2022; Husna *et al*., 2023). Properly selected learning media can also spark students' curiosity about the subject matter. In addition, they are useful in clarifying concepts that may be difficult to grasp through explanation alone (Alfarid, 2023; Puspitasari *et al*., 2023).

Learning media based on local potential is already widely used in educational settings. However, its availability remains very limited. The 2013 curriculum emphasizes the importance of teaching that is connected to the students' surrounding environment. This approach helps students better understand the material. It also allows them to recognize and appreciate the potential of their own region (AJ *et al.*, 2024; Anggraini *et al.*, 2024). Developing learning media and adopting innovative teaching strategies are essential efforts in enhancing the learning experience. These innovations help make lessons more engaging and reduce the sense of monotony in the classroom. As a result, students become more motivated

to learn. Innovative teaching involves the use of new ideas in instructional activities that can lead to improvements in both the learning process and outcomes (Fitriani *et al.*, 2023). Research on the development of local potential-based learning media has already been conducted. This is This research is comparable to the use of learning media such as Bivalvia posters in Pahunga Lodu, NTT, and the Gastropoda encyclopedia in Purworejo, Central Java (Andumeha *et al.*, 2023; Sulistiyawati *et al.*, 2023). The data presented in the learning media highlights the uniqueness of a region, such as the mollusc data from Menganti Beach in Central Java and Tanjung Rising in Bangka Belitung (Fatonah *et al.*, 2023; Ratih *et al.*, 2021)

The use of local potential as a learning resource is presented in various forms of learning media, one of which is the E-booklet. The E-booklet media is a booklet presented in digital format to convey materials in summary form and includes attractive images within the media, based on electronics that can be accessed via mobile phones and laptops, allowing students to use it anytime and anywhere (Susilo & Dewi, 2023). The use of E-booklets in learning has the advantage that students can learn independently according to their own pace, opportunities, and learning styles. E-booklets have similarities in their use in interactive media, with the only difference being their size (Wahidah et al., 2022) . Several E-Booklet developments have been carried out, including by Hidayati et al. (2024), who developed E-Booklet Media on the Solar System Material, followed by the E-Booklet development by Hanifah et al. (2020) on Plantae Material to Improve Biology Learning Outcomes, and by Alfarid (2023) , who developed an E-Booklet Based on Islamic Values on Animalia Material for Class X SMA/MA. Based on the above description, it is known that the utilization of local potential in school learning is still limited, especially in relation to biology learning, whether used as learning media in the form of support, enhancement, or enrichment. The development and publication of this learning medium are considered essential, as it holds the potential to serve as a valuable reference for high school students in future learning activities. Furthermore, this e-booklet is expected to contribute to biodiversity education by providing content based on science so that the aim of this research is to develop a research-based electronic booklet for the identification of Gastropod diversity.

METHOD

The research conducted falls into the category of development research (Research and Development) aimed at producing a developed product, which is then tested for its effectiveness. The research was conducted in the intertidal zone of Cibuaya Ujung Genteng Beach, Ujung Genteng Village, Ciracap Sub-district, Sukabumi Regency, West Java Province. The product developed in this research is the E-booklet on Gastropod Diversity at Cibuaya Beach. The model used in this research is the 4-D model. The 4-D development model consists of four main stages: dissemination, design, development, and dissemination (Irwandi *et al.*, 2019; Siregar *et al.*, 2022). In addition, the research method used is Research and development (R&D), which is the process of developing new products or improving existing products, then the final product is tested for effectiveness (Muqdamien *et al.*, 2021). However, the making of this E-booklet was only carried out until the development stage.

Based on the development model used, the development follows the stages instructed in the 4-D model. The stages in this development are 1) define, which includes data collection (field study), needs analysis, material analysis, teaching material analysis, and gastropod analysis. 2) design, which involves determining the location for gastropod sample collection and creating a design for the gastropod sampling technique. 3) development, which includes developing the designed teaching materials, validating the developed products, revising the validated products, and finalizing the products. The experts who evaluate the feasibility include subject matter experts, language experts, and media experts. Here are the steps for testing the E-booklet learning media: first, the expert will review and examine the E-booklet that has been created. Then, the expert is asked to fill out the questionnaire that has been prepared beforehand. Lastly, the expert is asked to provide suggestions or critiques to determine the feasibility of the E-booklet that has been created. The validity data of the learning media can be analyzed using the following formula:

$$P = \frac{\Sigma x}{\Sigma xi} \text{ x } 100\%$$

Explanation:

P   : Feasibility percentage

X   : Answer from the validity score

Xi   : Highest answer

Percentage that has been obtained then confirms the percentage of conformity with the following parameters

Table 1. Learning media feasibility scale

Percentage	Criteria
81% - 100%	Very Worthy
61% - 80%	Worth It
41% - 60%	Decent Enough
21% - 40%	Not Feasible
0% - 20%	Very Unworthy

The eligibility percentage can be categorized as very unfit if the P value is less than 21%, if it falls within the range of 21% - 40% it is categorized as unfit, if it falls within the range of 41% - 60% it is categorized as fairly fit, if it falls within the range of 61% - 80% it is categorized as fit, and if the P value is more than 81% it is categorized as very fit (Aisyah & Sulaikho, 2021).

RESULT AND DISCUSSION

The results of the research on gastropod diversity on Cibuaya Beach were implemented in the field of education in the form of E-booklet learning media on the diversity of Gastropods on Cibuaya Beach, Ujung Genteng. The E-booklet can then be used as a learning media in schools for the Kingdom Animalia material for 10th-grade high school students. This E-booklet features 25 species of Gastropods, designed to help students learn about Gastropods, particularly those found at Cibuaya Beach, Ujung Genteng. It is accompanied by engaging images that can motivate and spark students' curiosity, encouraging them to explore more about Gastropods. Additionally, the objectives that can be achieved by using this E-booklet as a learning media include understanding the general characteristics of the Gastropod class, the classification of Gastropods based on body structure, reproduction, habitat, and the role of Gastropods.

E-booklets can be used to support the learning process, as their content is in line with basic and core competences. Attention should be paid to several aspects when creating the e-booklet, such as material aspects, presentation aspects, linguistic aspects and graphical aspects (Ramdoni *et al*., 2021). The creation of this learning media in the form of an E-booklet was carried out through several stages, including information gathering, media feasibility testing, and the revision stage. The information gathering stage began with research at Cibuaya Beach, Ujung Genteng, resulting in the identification of 25 species of Gastropoda, which belong to three orders: Littorinimorpha, Neogastropoda, and Tochida. The findings were then presented in the form of descriptions and images. Meanwhile, the feasibility testing stage up to the revision was conducted by testing three aspects: the content aspect, the language aspect, and the media aspect, carried out by six validators consisting of three lecturers and three high school biology teachers. This feasibility testing stage aims to determine whether the developed learning media is good and feasible, so it can be used effectively in the field of education.

The revisions made to the E-booklet are presented in the form of comparative images between before and after the revision. Figure 1 shows the revisions to the front and back covers by removing the FKIP logo, leaving only the Pakuan University logo on the front and back covers. The next revision is in the placement section by moving the title of the E-booklet on gastropod diversity to the top, and changing the order of names to the author's name first, followed by the name of the supervisor.
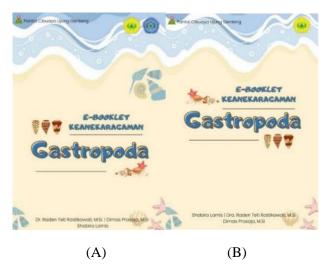
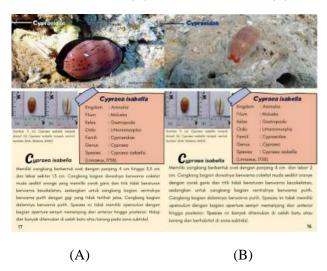Figure 1. Cover of the E-booklet: (A) before revision and (B) after revision

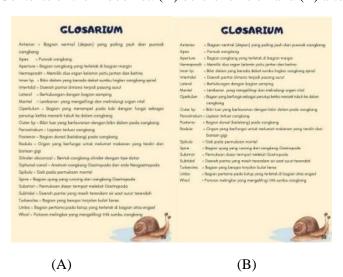Figure 2. Contents of the E-booklet: (A) before revision and (B) after revision

Figure 3. Glossary: (A) before revision and (B) after revision

Figure 2 shows the revision of the E-booklet content, namely replacing photos with self-documentation results and adjusting the font color in the family section to make it clearer and more visible. Then, Figure 3 shows the revision of the glossary, namely improving the writing in the glossary to make it neater and more harmonious. In addition to providing suggestions and input, the validator also evaluated the E-booklet media that had been created. The assessment was carried out by filling out a validation sheet based on material aspects, language aspects, and media aspects by the validator. The results of the validation assessment are presented in Table 2.

Table 2. E-booklet validation results

Expert Validation	Score Rating (%)	Criteria
Expert 1 (content)	70	Worth It
Expert 2 (language)	72	Worth It
Expert 3 (media)	83	Very Worthy
Expert 4 (teacher)	86-92	Very Worthy

Based on the results of the E-booklet media validation conducted by six validators, the results obtained from the material expert obtained a score of 70%, the language expert obtained a score of 72%, the media expert obtained a score of 83%, biology teacher 1 obtained a score of 91%, biology teacher 2 obtained a score of 92%, and biology teacher 3 obtained a score of 86%. So that the e-booklet media is included in the category of sufficient to very sufficient (criteria). The average results of the E-booklet validation from the aspects of content, language, and media can be seen in Table 3.

Table 3. Average validation score of the e-booklet

Validation Aspect	Score	Criteria
Material Aspect Language Aspeect Media Aspect	86 %	Very Worthy
Category		**Very Worthy**

The results obtained for the materials aspect received an average score of 87%, which is in the very high range, with the highest score for the indicator of compatibility of the material with the KD, as the material in the e-book is compatible with the KD and thus helps students achieve the learning outcomes. Core competencies are the minimum knowledge that students must have in a learning environment, the conceptual orientation of the material in the teaching materials must be in accordance with the learning objectives in order to achieve the expected competencies (Sarip *et al.*, 2022). The linguistic aspect obtained an average score of 83% which is included in the very appropriate category with the highest score on the grammatical element indicator. This is because the language used in the e-book is easy to understand. Simple language can make it easier for readers to understand the information contained in the text. The use of the right language style can also attract the attention of readers (Inderasari *et al.*, 2021; Ramdoni *et al.*, 2021). The media aspect received an average score of 88%, which falls into the very feasible category, with the highest score on the design indicator. This is in line with Fadli *et al.* (2017) who explained that a good e-book medium takes into account the font size to ensure the text is easy to read and the clarity of the image to attract readers. A good e-book medium should be organised systematically so that its function as a learning tool can be achieved and implemented effectively (Paramita *et al.*, 2019).

According to the results obtained, an overall average score of 86% was achieved, which falls into the category of very feasible. With the use of teaching materials in the form of e-books, it is expected that the learning process will no longer be solely teacher-centred. The teacher can serve as a facilitator, creating a learning environment that directly involves students, making them more active participants in the learning process. Learners become more active if they are in a learning process that can create an

enjoyable atmosphere and engage in activities such as reading, writing, speaking, expressing opinions and interacting with peers and teachers. The use of multimedia in the learning process can make learners think critically, solve problems, be more active in searching for information and be more motivated in the learning process (Muhammad, 2016; Aprijal *et al*., 2020; Wulandari *et al*., 2023). In this point, teaching materials in the form of e-books can be used to support the learning process at school.

CONCLUSION

Based on the results of the research on the development of e-booklets on gastropod diversity in Cibuaya Beach, Ujung Genteng, which was developed using the 4-D model, the media expert scored 88%, the language expert 83%, and the material expert 87%. These values indicate that e-booklets can support learning with a very feasible category and can be used in learning activities. Based on the results of the study, it can be concluded that e-books are very feasible to be used as learning media. The implications of the results of this study are expected to be an alternative solution for teachers in using learning media to make it more interesting, effective and the material can be easily understood by students, and learning is more meaningful.

ACKNOWLEDGMENTS

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