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Development of Encyclopedia Learning Media Based on Local Vegetables as An Innovative Biology Learning Resource

Mery Sofianti, Ari Sunandar, Mahwar Qurbaniah*
Biology Education, Faculty of Teacher Training and Education,
Universitas Muhammadiyah Pontianak, Indonesia.
*Corresponding Author. Email: mahwar.qurbaniah@gmail.com

Abstract: This research aims to produce an encyclopedia learning media that is both valid and practical for improving students' understanding of biodiversity material. The research utilized a modified 4-D development model, streamlined into 3-D, which included the stages of Define, Design, and Develop. The instruments used comprise interviews and documentation. Data analysis included validation of the encyclopedia's development and analysis of student responses to the developed media. The results from the validation tests and student responses indicated positive outcomes. Media experts rated the validation at 95.83% (very valid), material experts at 84.28% (very valid), and language experts at 83.33% (valid). Students who responded to the small-scale trial were very good, scoring 92.18% (very valid), while those who responded to the large-scale trial were also very good, at 91.03% (very valid). In conclusion, the validity results were very positive and the response outcomes were highly favorable. Thus, the encyclopedia media is deemed valid for use by educators and students in the biodiversity learning process.

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Introduction

21st-century education has the characteristics of cognitive skills consisting of 4C skills, namely critical thinking, communication, collaboration, and creativity (Ramadina, 2023). Learners are required to develop creative and critical thinking skills in solving problems related to learning materials, while teachers only provide guidance and direction to students so that learning does not deviate from predetermined learning objectives (Suyitno, 2012). One way to increase students' interest in learning is to use tools or media that can not only be an interesting learning resource, but can also overcome the limitations of space, time, and energy (Wulandari, 2023).

The teaching and learning process requires media that is used as support in the learning process (Erawati et al., 2020). A teacher must be able to choose learning media that suit the needs of students to achieve the desired learning process results. Biology learning is interesting, meaningful, fun, and related to everyday life (Aroyandini et al., 2020; Athiyah, 2018; Sudirgayasa et al., 2021). According to IUCN provisions, biodiversity is the diversity of living things from various sources, including land, water, oceans, and other aquatic ecosystems. (Suwarso et al., 2019). Biodiversity is one of the materials studied in biology subjects.

Based on observations and interviews conducted with science teachers and students of Class VII at SMP 01 Sukadana in West Kalimantan, science instruction relies on packet books and PowerPoint media. One of the subjects covered is biodiversity. However, the

current media do not effectively aid students in understanding biodiversity material. Additionally, not all learning materials can be covered due to time constraints, and there is a lack of learning media based on local potential. This situation makes it challenging for students to grasp the material, especially biodiversity. Therefore, there is a need to optimize learning to make it more effective and efficient. An encyclopedia could be a suitable media to achieve this.

An encyclopedia is a collection of objects or a series of books containing definitions, introductions, descriptions, or discussions of a particular scientific field, along with its bibliography. It is a resource that includes descriptions accompanied by attractive images aimed at clarifying the topics discussed, and it is organized systematically and alphabetically (Ramadina, 2023). According to Tantriadi (2013), encyclopedias provide visualizations that can engage students in the learning process and enhance their understanding of the material.
In Ketapang Regency, there are 30 types of local vegetables. However, not all of these vegetables are familiar to students by name. Students at SMAN 1 Sandai reported that they did not recognize certain vegetables because they had never seen, consumed, planted, or sold them (Wulandari, 2023).

According to Mulia et al (2019) this local potential can be utilized as a learning resource in the form of an encyclopedia so as to increase students' knowledge about various types of medicinal plants included in local potential-based seed plants (spermatophyta) which can help implement the 2013 curriculum. According to Habiba et al (2023) the application of the biodiversity encyclopedia of Jepara Regency has a good effect on conservation attitudes. According to Aini et al (2024) Research that has been conducted produces learning media in the form of an encyclopedia of local vegetables in North Kayong Regency which can help contextual learning and broaden students' insights about local potential and how to use it. According to Erawari et al (2020) opinions from students regarding the media Encyclopedia of Plant Forms and Functions used as media to improve students' critical thinking skills.

So, the development of a local vegetable-based encyclopedia in Ketapang Regency is different from encyclopedias that have been widely developed because this encyclopedia only refers to local vegetables in Ketapang Regency. The development of this encyclopedia is expected to help students recognize local vegetables and help understand biodiversity material based on local potential. This research aims to produce an encyclopedia learning media that is valid & practical in improving students' understanding of the biodiversity material.

Research Method

This research was included in Research and Development (R&D). That is a research method used to produce certain products, and test the effectiveness of the method (Mulyantiningsih, 2012). The development of this method applies the 4D design consisting of four stages of define, design, develop and disseminate, or it can also be called 4P, which was developed by Thiagarajan, namely (Mulyantiningsih, 2012) (1) defining, (2) designing, (3) developing, and (4) disseminating. The development model used in this study only reaches the development stage (Develop). While the dissemination stage (Disseminate) was not carried out due to time and cost constraints.

This research was conducted at SMP N 01 Sukadana, West Kalimantan. The research subjects were seventh grade science students for a small scale test of 8 and 24 for a large scale test. Data collection in this study was conducted through three main methods: interviews, observations, and questionnaires. Interviews were used to obtain in-depth information from participants about their experiences and views related to learning media.

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Observations were made to directly observe the interaction and use of media in the learning context. Meanwhile, questionnaires were distributed to collect quantitative data regarding participants' responses and assessments of the effectiveness of the media. These three methods are expected to provide a comprehensive picture of the effectiveness and impact of the developed learning media. The questionnaire includes questions that use a Likert scale that aims to see the feasibility or validity of the media. This validity data was obtained from expert lecturers, namely material experts and media experts and linguists. Questionnaire data regarding expert responses regarding the feasibility of development products were analyzed by transforming the average score of all observed aspects into sentences with criteria bay (Ernawati & Sukardiyono, 2017).

Percentage (%)	Validity Criteria
85 – 100	Very Valid
70 – 85	Valid
50 – 70	Less Valid
10 – 50	Very Invalid

Results and Discussion

The research process consists of three main stages, namely Define, Design, and Develop. The Define stage aims to determine and define the learning requirements. This stage consists of five main steps, namely front end analysis, student analysis, concept analysis, learning media analysis, and goal formulation. Front end analysis based on observations and results of interviews that have been conducted with science subject teachers (Science) students in class VII SMPN 01 Sukadana that the main problem in the learning process is the lack of interesting learning media.

The media that are often used in classroom learning are textbooks and power points. This is in accordance with Indriani's (2016) statement that media is a very useful tool for students and educators. After the needs analysis is carried out, then proceed with the analysis of student characteristics. Student analysis based on the results of interviews conducted with VII grade students of SMPN 01 Sukadana that students prefer interesting learning media. Through observation, concept analysis aims to select material. The material displayed on the encyclopedia media to be developed is biodiversity material, namely the definition of biodiversity, the level of benefits, morphology and distribution. Learning activities using local potential-based encyclopedias can make students understand the values that exist in the surrounding environment, improve student learning outcomes, and create more effective and meaningful learning (Kumala & Setiawan, 2019).

Learning media analysis aims to find out the media used by teachers in teaching activities. The results of interviews with Biology subject teachers obtained information that the media used were quite varied but the teacher had never made learning media based on local vegetables. Thus, the researcher developed learning media in the form of a local vegetable-based encyclopedia. Formulation of Learning Objectives through analysis of core competencies and basic competencies, researchers determine the learning objectives to be achieved. Therefore, teachers and students expect learning media that are contextual and based on local potential. Good learning media is learning media that is able to stimulate students' thoughts, focus, and enthusiasm for what they learn (Nurrita, 2018).

The Design stage aims to design learning media. The design stage produced a media encyclopedia based on local vegetables in Ketapang Regency. The media is accompanied by a design equipped with pictures of local vegetables and descriptions, distribution and morphology of vegetables so that the material is made brief and fun. This is supported by

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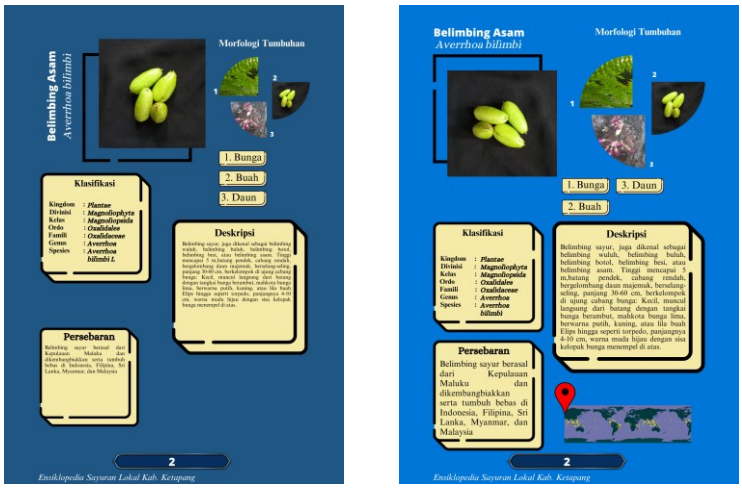
research conducted by Wahyuningsih (2011) which states that fun learning causes a positive response from students. Media encyclopedia based on local vegetables of Ketapang Regency. Designed using the canva application.

(A) **(B)**

Figure 1. Making an encyclopedia cover design based on local vegetables. (a) before revision, (b) after revision

Then the encyclopedia includes the author's name, color design, logo, and title name. Next, the design of the encyclopedia content must be clear and readable, and the addition of maps in the distribution section to make it more attractive (Figure 2).



(A) **(B)**

Figure 2. Content creation of local vegetable-based encyclopedia. (a) before revision, (b) after revision.

The Develop Stage is carried out to obtain input and suggestions that become revisions from three validators consisting of media experts, linguists, and material experts. This stage consists of a testing stage so that the local vegetable-based encyclopedia media produced by Ketapang Regency can be said to be feasible.

Table 1. Results of validator assessment

Expert Validator	Percentage of Validity (%)	Criteria
Media Expert	95,83	Very Valid
Material Expert	89,28	Very Valid
language **E**xpert	83,33	Valid

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Based on Table 1, the assessment results from media experts, material experts, and linguists indicate that the local vegetable-based encyclopedia media is suitable for use. Specifically, media experts rated the media as very valid (95.83%), material experts also rated it as very valid (89.28%), and linguists rated it as valid (83.33%).

The validity of the local vegetable-based encyclopedia media for Ketapang Regency is assessed based on three aspects:

1) Material Aspect: The purpose of material validation is to determine the accuracy and relevance of the content in relation to learning needs. The average validity score is 89.28%, with individual scores from validators being 96.42%, 85.71%, and 85.71%. According to Khairunnufus (2019), this rating indicates that the media is very valid. This demonstrates that the local vegetable-based encyclopedia for Ketapang Regency is considered very feasible based on material experts' assessments.
2) Language Aspect: The assessment by linguists aims to evaluate the accuracy of the language used in the media. The average validity score is 83.33%, with individual scores from validators being 80%, 75%, and 95%. According to Bintinngtiyas and Lutfi (2016), this rating confirms that the media is valid. Thus, the local vegetable-based encyclopedia for Ketapang Regency is considered feasible based on linguistic evaluations.
3) Media Aspect: Media expert validation assesses the suitability of the media's appearance, including the alignment of teaching materials, the design of teaching materials, and the media display. The average validity score is 95.83%, with individual scores from validators being 92.18%, 100%, and 95.31%. According to Surani (2018), this rating indicates that the media is very valid. This confirms that the local vegetable-based encyclopedia for Ketapang Regency is deemed very valid based on media experts' assessments.

Although it has been declared valid, the encyclopedia media still undergoes some improvements according to the suggestions and input from the validator. Some of the revisions made by the validator are changes in the cover color to make it brighter, design that must be improved, and changes in font size in the encyclopedia medi description. After the teaching materials were revised or improved according to the validator's suggestions and comments, the encyclopedia based on local vegetables of Ketapang Regency to improve student learning outcomes was declared suitable for use in learning. The encyclopedia developed is feasible and can be used in classroom learning, after undergoing revision of repair habits in accordance with the input and suggestions of validators.

Table 2: Student Response Results

Trial	Percentage of Validity (%)	Criteria
Small Scale	92,18%	Very Positive
Large Scale	91,03%	Very Positive

Based on the results in Table 2, the small-scale trial assessment scored 92.18%, and the large-scale test scored 91.03%, both with very positive criteria. It indicates that encyclopedia media is categorized as very valid. Therefore, the encyclopedia is highly effective in improving student learning outcomes in science education. The local vegetable-based encyclopedia for Ketapang Regency is a collection of materials containing essential information presented visually, which helps students obtain information through visual representations (Hermanto, 2020).

Using the local vegetable-based encyclopedia in learning is more effective and systematic because it provides brief, concise, and easily understandable descriptions. The encyclopedia is designed to support teachers in the learning process and can serve as a reference for teachers and schools during each learning session. It aims to enhance higher-

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order thinking skills and provide a meaningful learning experience. Consequently, developing a local vegetable-based encyclopedia can serve as a solution to improve student learning outcomes and educational progress in Indonesia. Moreover, this encyclopedia is not only useful for biodiversity materials but can also be adapted for other learning topics.

This research contributes to the preservation of traditional knowledge about local vegetables by documenting various types of vegetables and their benefits. In doing so, it enhances the understanding of the relationship between local culture and vegetable use. The development of a local vegetable-based encyclopedia provides a comprehensive database of vegetable species, their benefits, and their uses. This encyclopedia can serve as an educational tool for local communities and the younger generation, increasing their awareness of the importance of local vegetables and their processing methods. The information obtained from this research can be used to develop vegetable-based products, such as processed foods or herbal medicines, potentially providing an additional source of income for the community. Additionally, this research can assist local farmers in selecting and managing vegetable varieties that are best suited to their environmental conditions, thereby improving agricultural productivity and sustainability. Knowledge of the health benefits of local vegetables can also support efforts to improve public health. By consuming nutrient-rich local vegetables, individuals can reduce the risk of diet-related diseases and enhance overall well-being. Data from this encyclopedia can be utilized by policymakers to design support programs for local farmers, protect local plant varieties from extinction, and promote the use of local vegetables in both local and national food programs. Overall, the research on Ketapang Regency's local vegetable-based encyclopedia not only contributes to the preservation and utilization of local knowledge but also offers extensive practical benefits in education, economics, health, and public policy.

Conclusion

Based on the research results, the encyclopedia learning media meets the following validity aspects: language aspect at 83.33% (valid), material aspect at 89.28% (very valid), and media aspect at 95.83% (very valid). Students' responses to the developed encyclopedia learning media indicated a percentage of ease of understanding of 91.03% for the large-scale test and 92.18% for the small-scale test. The validity results are very favorable, and the response outcomes are very positive, indicating that the encyclopedia media is suitable for use by educators and students in the biology learning process.

Recommendation

1) Recommendations for Teachers: Design learning activities that involve the encyclopedia, such as research projects on local vegetables, quizzes or group discussions. Use this medium to measure student understanding through formative and summative assessments. Provide feedback to students on the use of the media, and adjust teaching content or methods based on student responses.
2) Recommendations for Students: Utilize the local vegetable-based encyclopedia to explore information about different types of vegetables. Apply the knowledge gained from the encyclopedia in daily activities, such as choosing healthy local vegetables and understanding how they are cultivated. Reflect on the information learnt and how it can be applied in real-life contexts.
3) Recommendations for Future Researchers: Further research to develop variations of local vegetable-based learning media, including digital or interactive versions. Conduct further studies to test the effectiveness of this media in different learning contexts and with different

groups of students. Collect feedback data from media users to evaluate aspects that need improvement. Adjust the media based on feedback and evaluation results to improve its relevance and effectiveness. Publish the results of the media research and development to share knowledge and best practices with the wider education community.

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