

Development of encyclopedia based on local vegetables North Kayong Regency as biology learning media

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Abstract: The people of North Kayong Regency-West Kalimantan still uphold the culture of utilizing plants as food, known as North Kayong local vegetables. Preserving knowledge about existing local potential and its utilization can be done through education based on local wisdom or local potential. It can be employed as a tool to enhance the efficacy and significance of education while preserving the unique possibilities of every area. The K13 curriculum is a curriculum of change from conceptual learning to contextual learning. The education process according to regional potential can be done through encyclopaedia media that attracts readers because the encyclopedia contains explicit information and is accompanied by pictures with bright colours. analysis and development, the creation of a local vegetable-based encyclopedia of North Kayong Regency as a biology learning media using a development model (D&D) consisting of six stages, namely: problem identification, description of objectives, design and development, product trials, evaluation of trial results, and communication of trial outcomes. The outcomes of validation and students response trials to the encyclopedia media developed obtained perfect scores. Where the validation test received a value from media experts of 97.08% (very valid), material experts of 90.22% (very valid), and language experts of 88.14% (very valid). Students responded very well to the small-scale (78.83%) and large-scale (84.47%) trials.

Keywords: D&D; encyclopedia; learning media; North Kayong; vegetables

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Introduction

West Kalimantan is one of Indonesia's provinces with the largest tropical rainforest in Southeast Asia and the wealthiest diversity of species (Alamgir et al., 2019; Istiani et al., 2021). This species diversity can be found in almost all areas of West Kalimantan, one of which is in the North Kayong Regency area, which consists of 75 islands spread across Maya Island, Simpang Hilir, and Sukadana Districts (Hendra, 2018). North Kayong has the potential for local vegetables; this is known through interviews conducted with the Snowball Sampling technique to the people of North Kayong, resulting in clear information that the people of North Kayong still uphold the culture of utilizing plants as food known as local vegetables. Ethnobotany is the study of community culture utilizing plants that benefit humans, including food (Atmojo, 2015; Firdawati et al., 2021; Helmina & Hidayah, 2021).

Knowledge about existing local potential and its utilization can be preserved through education. Education based on local wisdom or potential can protect each region's local potential and make the learning process more effective and meaningful (Rummar, 2022; Wahyuni et al., 2021). This is supported or in line with the K13 curriculum, which is seen as a change in the educational paradigm from conceptual to contextual (Rumahlatu et al., 2016; Vasmin et al., 2020). However, environmental potential is rarely used in learning because the open environment far from school requires a long lesson time, so

innovations are needed to support learning (Cahyanti et al., 2021). Local potential-based learning oriented towards increasing environmental care attitudes needs to be supported by the availability of appropriate teaching materials (Rahmi et al., 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 so that the results of the desired learning process are achieved. An encyclopedia is a book containing descriptions accompanied by pictures or illustrations that aim to convey a topic (Hermanto et al., 2021; Nurdiansyah et al., 2021). The choice encyclopedia is a learning resource because it has advantages over other learning resources: one contains clear images and information presented and is easy to understand and explain in detail (Rima et al., 2022; Wijarini, 2022).

Biology learning is engaging, 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 among living things from various sources, including land, water, oceans and other aquatic ecosystems (Suwarso et al., 2019). Biodiversity is one of the materials learned in biology subjects. Based on the results of interviews and observations conducted at the SMAN 1 Sukadana school, the results show that the curriculum used is still the K13 curriculum, the learning media used is still a biology textbook written by Irnaningtyas published by Erlangga 2013 and PowerPoint, where according to students the learning media used is still not contextual and directly related to everyday life, and not based on local potential. So teachers and students expect contextual and local potential-based learning media. Based on the description above, researchers are interested in developing learning media as a local vegetable-based encyclopedia of North Kayong Regency as a biology learning media. The purpose of this study was to determine the validity and student response to the local vegetable-based encyclopedia that had been developed. The selection of encyclopedia media as the media developed because the encyclopedia is a learning media that contains images with bright colours and information that is easy to understand.

Images with bright colours and precise information are supported by previous findings on developing an encyclopedia based on the ethnobotany of wrapping plants of the Malay tribe of Meliau District (Sabilla et al., 2023). The practicality of the encyclopedia of the Myrtaceae family of the Benua Botanical Garden collection is to train students' critical thinking skills (Adawiyah et al., 2023). Development of an encyclopedia of fungal diversity in Bleber Bener Purworejo Village as an independent learning resource for SMA / MA students (Febriani & Widodo, 2021), where all the results received positive responses from experts and students. This research is expected to produce a learning resource on biodiversity material that can add insight to students and help teachers in the teaching and learning process.

Method

This development and research (R&D) produced, a product as a local vegetable-based encyclopedia of North Kayong Regency as a biology learning medium. The development methodology applied in this research is the Design and Development (D&D) framework, that consists of six stages (Aeni et al., 2022; Ihsan, 2017; Maharani & Rahmah, 2018).

The stages of development carried out are problem identification, description of objectives, design and development, product trials, evaluation of trial results, and communication of product trial results. The problem identification stage includes interviews, observation, and identification. The description stage includes exposure related to the objectives of product development. The design and development stage includes format selection, initial design, initial draft and expert validation with Three material experts, three language experts, and three media experts made up the validation panel. The product trial stage includes small-scale trials with 20 students and large-scale trials with 54 class X SMAN 1 Sukadana students. The evaluation stage of product trial results includes summative evaluation and formative evaluation. The communication stage includes writing a report on the research that has been done. To measure the level of validity of local vegetable-based encyclopedia media in North Kayong Regency as a biology learning media using the Formula 1:

$$p = \frac{\sum_{i=1}^4 x_i}{\sum_{j=1}^4 x_j} \times 100\% \quad (1)$$

where P: Percentage of choice; $\sum x_i$: Number of answer scores by expert assessment; and $\sum x_j$ = Number of highest answer scores. Meanwhile, as a basis for making decisions to revise the learning media, the following assessment criteria in Table 1 were used.

Table 1. Category of Validity of Encyclopedia

Percentage (%)	Criteria	Description
80-100	Very Valid	No Revision
66-79	Valid	No Revision
56-65	Valid Enough	No Revision
40-55	Less Valid	Revision
30-39	Invalid	Revision

The analysis of student responses to the development of a local vegetable-based encyclopedia of North Kayong Regency as a biology learning media aims to measure the percentage of encyclopedias developed using the [Formula 2](#):

$$\% NRS = \frac{\sum_{i=1}^n NRS}{NRS \text{ Maximum}} \times 100\% \quad (2)$$

where %NRS: Percentage of student response scores (NRS); $\sum_{i=1}^n NRS$: Total student response (NRS) scores on each question item, $NRS \text{ maksimum} = \pi \times \text{best choice score}$, and with n being the number of all respondents.

The student response categories are in [Table 2](#).

Table 2. Student Response Percentage Categories

%NRS	Category
$0\% \leq \%NRS < 36\%$	Very Less
$36\% \leq \%NRS < 52\%$	Less
$52\% \leq \%NRS < 68\%$	Simply
$50\% \leq \%NRS < 75\%$	Good
$75\% \leq \%NRS \leq 100\%$	Very Good

Students' responses are said to be positive if the results of student responses show 50% of good and very good criteria.

This study's measurement tool is a Likert scale according to [Taluke et al \(2019\)](#) criteria ([Table 3](#)).

Tables 3. Likert Scales Categories

Categories of Learner' Answer	Score	
	Positive	Negative
STS	1	5
TS	2	4
CS	3	3
S	4	2
SS	5	1

Results and Discussion

Research and development with the D&D model produced a product as an encyclopedia based on local vegetables in North Kayong Regency as a biology learning media. The problem identification stage is the first stage carried out in this study. The problem identification stage to determine the curriculum used by the school, the fundamental problems faced by the school, the learning media used, and the data on local vegetables of North Kayong through conversations with biology instructors and three students of SMAN class X 1 Sukadana obtained the results that the curriculum used at school is the K13 curriculum, the fundamental problem faced at school is still the lack of contextual and local potential-based learning media. Through observation of learning media at school involving biology instructors and class X students SMAN 1 Sukadana, the findings demonstrate that the learning resources still utilized include biology package books written by Irnaningtyas published by Erlangga 2013 and PowerPoint points, which for students the learning media is still not contextual and not directly related to everyday life. Therefore, teachers and students expect contextual and local potential-based learning media. Media for learning is a tool. teachers use to convey information in the learning process in order to fulfill learning objectives. Good learning media is learning media that is able to stimulate students' thoughts, focus and enthusiasm for what they are learning ([Nurrita, 2018](#)). One of the learning media by the K13 curriculum on conceptual learning is the local vegetable-based encyclopedia media of North Kayong Regency

because it contains images with bright colors and information made using language that is easy to understand. It is necessary to establish local potential-based learning, as an effort to reveal the local potential in an area and its benefits, and can positively influence learning (Sriyati et al., 2021; Wahyuni et al., 2021). Learning activities using encyclopedias based on local potential can make students understand the values in the surrounding environment, improve student learning outcomes, and create more effective and meaningful learning (Kumala & Setiawan, 2019).

Identification of local North Kayong vegetables is the final activity at the problem identification stage. The identification of local vegetables was carried out by interviewing informants who were North Kayong people, community stores, vegetable traders, and homemakers with an age range of 30-50 years. Informant interviews were conducted using the Snowball Sampling technique, where sampling starts from small to large (Kennedy-Shaffer et al., 2021; Nurdiani, 2014). The results of the identification of local vegetables produced 19 types of local vegetables that the people of North Kayong utilize can be seen in Table 4.

Table 4. Local vegetables of North kayong Regency

No	Local Name	Scientific Name	Parts Used	Processed Vegetables
1.	Starfruit Reed	<i>Averhoa bilimbi</i>	Fruit	Sambal stir-fry and tamarind substitute
2.	Bebuas	<i>Premna cordifolia</i>	Leaves	Substitute for kesum leaves in taro curry, fres vegetables and substitutes
3.	Budi	<i>Ficus septica</i>	Leaves	Cook the fat
4.	Gadong	<i>Dioscorea hispida</i>	Fruit	Cook the fat
5.	Water Guava	<i>Syzygium aqueum</i>	Fruit	Spicy-stir-fry
6.	Monkey Guava	<i>Anacardium occidentale</i>	Leaves	Fres vegetables
7.	Water Caladium	<i>Colocasia esculenta</i>	Trunk	Gouls
8.	Coconut	<i>Cocos nucifera</i>	Umbut coconut	Soup and fat cooking
9.	Moringa	<i>Moringa oliefera</i>	Leaves	Clear vegetable
10.	Male Kemunting	<i>Melastoma affine</i>	Leaves	Spicy stir fry
11.	Kenikir	<i>Cosmos causatus</i>	Leaves	Fres vegetables
12.	Kweni	<i>Mangifera odorata</i>	Fruit	Sambal stir-fry
13.	Noni	<i>Morinda citrifolia</i>	Leaves	Bebotok
14.	Dutch Jackfruit	<i>Annona muricata</i>	Fruit	Sambal stir-fry
15.	Papaya	<i>Carica papaya</i>	Fruit, leaves and flowers	Sweet vegetables, fresh vegetables and papaya flower kerabu
16.	Bananas	<i>Musa acuminata</i>	Fruit and heart bananas	Sour and spicy stir-try banana heart
17.	Bamboo Shoots	<i>Dendrocalamus asper</i>	Trunk	Spicy-stir-fry, cooked fat and dried bamboo shoots
18.	Compassion	<i>Ocium tenuiflorum</i>	Leaves	Fres vegetables
19.	Sweet Potato Gum	<i>Manihot esculenta</i>	Leaves	Fres vegetables

Considering the findings of the interviews that have been done, researchers make observations and documentation of the morphological characteristics of plants. The results of morphological identification and its utilization will be included in the encyclopedia product to be developed.

The goal description stage describes the purpose of the development carried out is to produce

encyclopedia media based on local vegetables in North Kayong Regency as a biology learning media tailored to Basic Competency 3.2 examines the several facets of Indonesia's biodiversity along with threats and conservation and Basic Competency 4.2 introducing multiple levels of biodiversity and proposed conservation efforts (Pramaditya & Ambarwati, 2020).

The design and development stage aims to design and produce local vegetable-based encyclopedia products in North Kayong Regency as a biology learning media. During the design phase, the tasks completed are format selection, initial design, and final draft of the encyclopedia. Selection of encyclopedia format includes encyclopedia size, font, paper used cover, preface, table of contents, introduction, instructions for use, material content, bibliography, glossary, and author's bio. The selection of the encyclopedia format is based on research (Renita, 2020; Maharani & Rahmah, 2018). The cover is the central part that provides an overview presented in the encyclopedia and is an attraction for readers; the material's content is the central part of the encyclopedia that describes the knowledge that students must learn. The encyclopedia developed in this study contains information on local names, scientific names, morphology, places found, parts used and their benefits.

Moreover, a QR contains processed videos of local Kayong Utara vegetables. The initial design was made based on a predetermined format. The final draft is a revised encyclopedia draft based on the validity test's findings and student response test. At the development stage, the activities carried out were validity tests to know the validity of the local vegetable-based encyclopedia of North Kayong Regency developed based on expert input (validators). The aspects assessed in the validity test are aspects of media feasibility, material feasibility, and language feasibility (Febriani & Widodo, 2021; Puspitasari & Febrinita, 2021; Rosyidah et al., 2019). The validity's outcomes trial is in Table 5.

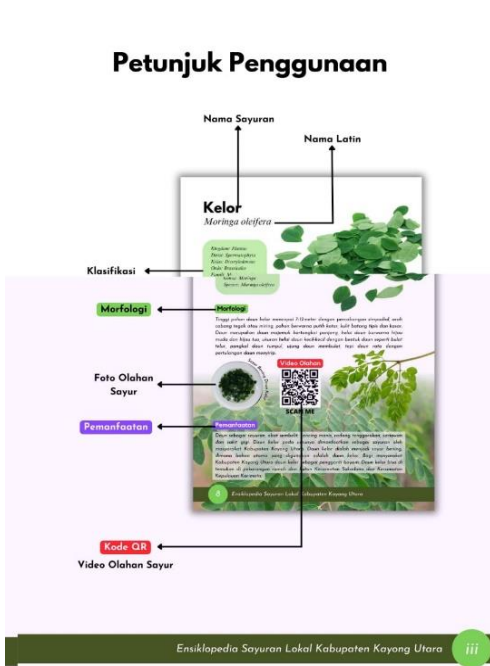

Table 5. Validator Assessment Result

No	Expert Validator	Percentage of Validity (%)	Criteria
1.	Media	97,08	Very valid
2.	Material	90,22	Very valid
3.	Bahasa	88,14	Very valid

The validity test involved three media, material, and language experts. Revisions to the encyclopedia were made based on feedback from the experts. The validity results that have been carried out show positive results. Thus, the encyclopedia developed is feasible to be tested in the field with slight improvement. The draft encyclopedia developed appears in the Table 6.

Table 6. Encyclopedia draft

No	Encyclopedia Selection	Figure
1.	Front and back cover	 <p>The figure shows two covers of the encyclopedia. The left cover is green and the right cover is grey. Both covers feature a central image of a green vegetable (possibly a bitter melon) with a QR code overlay. The text on the covers includes 'UM Pontianak' at the top, 'ENSIKLOPEDIA SAYURAN LOKAL KABUPATEN KAYONG UTARA' in the middle, and 'PROGRAM STUDI PENDIDIKAN BIOLOGI, FAKULTAS KEGURUAN DAN ILMU PENDIDIKAN, UNIVERSITAS MUHAMMADIYAH PONTIANAK' at the bottom.</p>

No	Encyclopedia Selection	Figure
2.	Instructions for use and materials	 

3.	Bibliography and glossary	
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The product trial stage was carried out utilizing both large- and small-scale experiments where the product trial aimed to measure student responses to the encyclopedia developed. The modest-scale experiment used 20 students and an extensive experiment of 54%. In the small-scale experiment, sampling was 20%, and in the extensive experiment, it was 60% of the total population (Prayitno, 2017). The response from the student trial is in Table 7.

Table 7. Student Response Data

No	Trial	Percentage of Validity (%)	Criteria
1.	Small Scale	78.83	Very good
2.	Large Scale	84.47	Very good

The overall assessment of the trial results consisted of 12 questions, divided into six positive and six negative questions. The aspects assessed include the appearance of the encyclopedia, the usefulness of the encyclopedia, the suitability of the material, and the straightforwardness of the language.

The evaluation stage of the product trial results using Formative assessment was done to gather information at all stages of D&D to revise encyclopedia media based on suggestions (feedback) from Linguists, media specialists, and material specialists. The summative evaluation was conducted to determine student responses and the impact of using the local vegetable-based encyclopedia of North Kayong Regency as a biology student media according to the analysis includes both large- and small-scale student response surveys. Furthermore, the communication stage of the product trial the final stage is results. of the D&D model. The activity is to write a report that aims to report all the stages carried out and the results of developing a local vegetable-based encyclopedia of North Kayong Regency.

The research that has been done produces learning media in the form of a local vegetable-based encyclopedia of North Kayong Regency, which can help contextual learning and add students' insights into local potential and how to use it. I also assisted teachers in delivering biodiversity material, especially on the diversity of flora in North Kayong Regency and the local potential of the area. Every activity in this study is scientific or by R&D research procedures using the D&D model. This research received a positive response from experts and students. Hence, the research results on developing a local vegetable-based encyclopedia of North Kayong Regency are from previous research on encyclopedia development and local potential-based learning.

Conclusion

Based from the findings of the conducted research, the media encyclopedia based on local vegetables of North Kayong Regency has fulfilled the validity aspects where the part played by the media in 97.08% (extremely valid), the tangible component of 90.22% (extremely valid), the language aspect 88,14% (very valid). Students gave excellent responses on small-scale and large-scale trials, with a value of 78.83% (excellent) both on a local and large scale, getting a value of 84.47% (very valid). It is concluded that the local vegetable-based encyclopedia of North Kayong Regency is conceivable to utilize as a biology gaining knowledge media on materials related to biodiversity.

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Conflicts of Interest

The researcher declares that there aren't any competing interests related to the writing of this article.

Author of Interest

S. Aini: Methodology; data analysis; manuscript writing; review and editing. **A. E. Setiadi:** Manuscript writing; review; reference finding and editing. **A. Sunandar:** Article writing; review; and editing.

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