The Eligibility of the Encyclopedia of Circulatory System Diseases and Disorders Based on Traditional Medicinal Plants for Hypertension as Learning Media

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Abstract. Learning media is an essential element to support the success of learning activities. It is used to stimulate the thoughts, feelings, attention, and interest of students to learn. Learning media can be developed by adding concepts and photos from the results of a research. The purpose of this study was to determine the feasibility of the encyclopedia of circulatory system diseases and disorders as a learning media. The content of encyclopedia contains the result from the inventory of medicinal plants for hypertension at Babane Village, Bengkayang, Indonesia. This study applied a research and development method. This development procedure refers to the Sugiyono development model, which consists of five stages namely potential and problems, data collection, product design, design validation, and design revision. The validity of the encyclopedia was obtained through content validation executed by five experts in the field of both biology and learning media. Encyclopedia validation is reviewed from four aspects: content, presentation, language, and graphics. Validation analysis applied the Lawshe's content validity ratio (CVR) and content validity index (CVI) approach. The results showed that the average of CVR was 1.00 which result in the CVI value of 1.00 in the "valid" category. Based on the result, it can be concluded that the encyclopedia was feasible as a learning media.

Keywords: circulatory system learning, development, encyclopedia

Introduction

The rapid development of science education requires educators to create creative and innovative learning tools (Rahmahtullah et al., 2022; Tafonao, 2018). Utilization of media, selection of methods, learning models, assessment systems, and the use of appropriate facilities and infrastructures are very much needed in learning (Fauziah, 2020; Sakiah & Effendi, 2021). Learning media is used as a means of supporting the learning process to achieve learning objectives (Puspitarini & Hanif, 2019). Learning media can improve the quality of education by increasing the speed of the learning (Abidin, 2017).

The use of learning media aims to make it easier for educators to convey material in the learning process (Panjaitan et al., 2021; Paramita et al., 2018; Wyner, 2013) and can stimulate the thoughts, feelings, attention, and interest of students to learn (Rahim et al., 2022; Tafonao, 2018). Quality media are practical and easy to use and can increase learning motivation, and stimulate and attract the attention of students (Djannah et al., 2020; Rasyid et al., 2017). The use of appropriate and interesting media will foster interest,
curiosity, and motivation of students to optimize the achievement of material delivery so that it is in accordance with learning objectives (Anjarsari et al., 2020; Sakiah & Effendi, 2021).

To achieve learning quality, the selection of learning media must be planned and determined carefully. Learning media must specifically be designed according to the needs to solve learning problems (Abidin, 2017; Kustyarini et al., 2020; Panjaitan et al., 2021). The learning media must be appropriate theoretically. They also need to be adjusted to the students' characteristics, their needs, and the cultural environment (Verawati et al., 2022). Thus, learning media can vary in terms of the content material presented (Sholeh, 2019). They can also be developed by adding concepts and photos from the results of a research (Panjaitan et al., 2021; Paramita et al., 2018). Though varied, all learning media need to be validated by experts before being used in the class (Panjaitan et al., 2021; Riani et al., 2019) to determine the feasibility of the media in the learning process (Anggraini et al., 2022; Renita et al., 2020).

One type of learning media is an encyclopedia. The encyclopedia is defined as a collection of writings that contain broad, complete and easy-to-understand explanations of various kinds of information regarding science or a particular branch of science arranged alphabetically or by category and printed in a book form (Noviar & Sulistiawati, 2013). As a learning media, encyclopedias have several advantages, i.e. acts to present messages or information in large quantities, can be studied anytime and anywhere, and is more interesting because it is equipped with pictures and colours (Arsyad, 2019). Thus, the encyclopedia provides visualizations that attract students' interest in the learning process (Sari, 2022; Tantriadi, 2013), which results in increasing students' motivation (Sulistiyawati & Hedianti, 2016), improving student's understanding of biological concepts (Rostikawati & Susanto, 2019), as well as improving learning outcomes (Hidayat et al., 2015; Rostikawati & Susanto, 2019).

The content of the encyclopedia may come from different areas, which in this research involves traditional medicinal plants. In investigating the use of traditional medicinal plants and revealing the diversity of traditional medicinal plants, the technique of inventory is applied. This technique relates to the process of recording, registering and data collecting of traditional medicinal plants (Kiuuk, 2018). The inventory of medicinal plants is carried out to picture the species of medicinal plants used by the community in the Babane village, Bengkayang, Indonesia and the specific procedures of using the plants to treat hypertension. Babane village is one of the villages in West Borneo which still practice the traditional medicinal approach. Then, the information is presented in the form of an encyclopedia with the goal to expand high school biology students' knowledge of local wisdom about using medicinal plants. The target is to provide content development in the sub-concept of circulatory system diseases and disorders which involve hypertension. The purpose of this study was to determine the feasibility of the content of an encyclopedia of diseases and disorders of the circulatory system from the results of an inventory of hypertension medicinal plants for high school graders.

Methods

This study uses a research and development procedure that has been modified from Sugiyono (2019), namely 10 stages. However, with limited time, the researcher only took 5 stages which consists potential and problems, data collection, product design, design validation, and design revision. The subjects in this study were 2 lecturers and 3 teachers that experts in the field of both biology and learning media. The object of this research is encyclopedia of circulatory system diseases and disorders which contains the result from

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the inventory of medicinal plants for hypertension at Babane Village, Bengkayang, Indonesia.

Figure 1. Research steps used by researchers

The stages of research include (1) potential and problems; this stages carried out by conducting interviews with biology teachers to find out the information to be used as the main ingredient in developing of innovative learning media for students (2) data collection; the content development of the encyclopedia carried out by conducting inventory data collection of traditional medicinal plants in Babane Village and the information collection of various circulatory system diseases and disorders sub-material, (3) product design; the design stage is conducted for designing the encyclopedia in the form of determining the content scope, planning the visual representation of the encyclopedia, compiling and editing the components, (4) design validation; the validity of the encyclopedia was obtained through content validation executed by five experts in the field of both biology and learning media. Encyclopedia is reviewed from four aspects: content, presentation, language, and graphics. This stage aims to get the feasibility of the product that has been developed. (5) revision design; revision of design based on validation of five experts of biology and media expertise to improve the initial product design for the better.

The purpose of this study was to determine the feasibility of the encyclopedia of circulatory system diseases and disorders as a learning media. The instrument used in this study was a media validation questionnaire with a Likert-scale rubric for four aspects. The validity analysis was carried out using the CVR refers to Lawshe (1975). The media is considered “valid” if the CVR value is equal to or greater than the CVR critical value. The CVR critical value for five validators is 0.99. The calculation of CVR as follow.

\[
CVR = \frac{ne - \frac{N}{2}}{\frac{N}{2}}\]  

(1)

Explanation:

CVR = Content Validity Ratio

Ne = The number of validators who determine the media as valid by giving the score 3 and 4 (agree), less than 3 it is considered to disagree

N = Sum of all validators

After identifying the statements on the validation sheet using the CVR, then the CVI is calculated to determine the overall validity value. In simple terms, CVI is the average of the CVR scores for test items answered “Yes”. CVI value is obtained by using the formula:

\[
CVI = \frac{\sum CVR}{\text{Number of Test Items}}\]  

(2)
Results and Discussion

The encyclopedia in this study is the result of developing an inventory of medicinal plants for hypertension in Babane Village, Samalantan District, Bengkayang Regency, West Kalimantan. This encyclopedia contains a brief description of the circulatory system, sub-materials on disorders and disorders of the circulatory system, pictures of medicinal plants for hypertension, local names, scientific name, brief descriptions, and how they are processed by the people of Babane Village. Learning media that will be used in learning must first be validated by experts (Panjaitan et al., 2021; Riani et al., 2019). The validation process is carried out to determine the feasibility of the encyclopedia so that it can be used in the learning process (Anggraini et al., 2022; Renita et al., 2020). The results of the validation analysis using Lawshe’s calculations can be seen in Table 1.

Table 1. Results of Encyclopedia Content Validity Analysis

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Indicator</th>
<th>Validator</th>
<th>CVR</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>1. Conformity of material with basic competencies, indicators of achievement of competencies, and learning objectives</td>
<td>4 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>2. The link between the material in the encyclopedia and its suitability with the level of academic ability of students</td>
<td>4 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>3. Encyclopedia materials/contents are appropriate and support the achievement of national education goals</td>
<td>4 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>4. Completion of submaterial disorders and disorders of the circulatory system</td>
<td>4 4 4 3 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>5. Completeness of presentation of information on hypertension medicinal plants</td>
<td>4 3 3 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td>Presentation</td>
<td>6. Clarity of instructions for use</td>
<td>3 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>7. The order of presentation of the material</td>
<td>3 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>8. Index availability</td>
<td>3 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>9. There is a bibliography as a reference</td>
<td>4 3 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>10. Illustrations/images support the content</td>
<td>3 3 4 3 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td>Language</td>
<td>11. The language used has a high level of legibility</td>
<td>3 4 3 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>12. Accuracy in the use of language</td>
<td>3 4 4 3 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>13. The use of language and sentences in accordance with the general guidelines for indonesian spelling (PUEBI)</td>
<td>3 4 4 3 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td>Graphic</td>
<td>14. The paper size used is A4 (21.0 x 29.7 cm) according to ISO standards</td>
<td>4 4 4 4 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>15. The attractiveness of the encyclopedia cover design</td>
<td>3 3 4 3 4</td>
<td>1,00</td>
<td>Valid</td>
</tr>
</tbody>
</table>
The results of the analysis of the validity of the contents of the encyclopedia get a CVI value of 1.00 with a valid category which indicates that the encyclopedia as a whole is feasible to use in the learning process. The following will describe the aspects of feasibility assessment in validating the contents of the encyclopedia and the input provided by the validator.

**Content Aspects**

The content feasibility component consists of five indicators. The first indicator, namely conformity with SK, KD, and learning objectives, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the encyclopedia material described reflects the substance of the material that is relevant to basic competence (KD), competency achievement indicators and learning objectives. According to Widyawati & Prodjosantoso (2015), the first step in analyzing learning needs is to map KI, KD and Indicators. Indicators are then formulated into learning objectives that are developed according to the characteristics of students (Anggraini et al., 2022; Indrawini et al., 2017). According to Sutrisno (2014), the material taught should be sufficient enough to help students master basic competencies and the learning objectives to be achieved. The feasibility of the developed media can be seen from the material aspects that are in accordance with KD, indicators, and learning objectives (Pinatih & Putra, 2021).

The second indicator, namely conformity with the needs of students, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the description of the material presented in the encyclopedia is interrelated, easy to understand, and in accordance with the level of academic ability of students (Figures 2a and 2b). In order to be able to help the learning process effectively, the material presented in the media must be aligned and in accordance with the needs of the learning task and the mental abilities of students so that the material will be easily accepted according to the stages of the reader’s cognitive development (Ariyanti, 2020; Asyhari & Silvia, 2016). This suitability is related to information from the material presented so that it will build the integrity of the concept at the level of students' thinking (Kurniawan, 2015).

The third indicator, namely compatibility with national education goals, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the encyclopedia material met the criteria that support the achievement of national education goals. According to Batubara & Ariani (2017), the material contained in learning media as a source and learning tool that integrates directly with students plays an important role in integrating character education so that the implementation of character education as a national education goal can be achieved properly. The fourth indicator, namely the suitability of the material with the syllabus, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the material has been presented according to the syllabus. The fifth indicator, namely the completeness of the presentation of additional information, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the presentation of information about medicinal plants for
hypertension is equipped with common names, scientific names, photos of plants, brief descriptions of plants and methods of processing medicinal plants (Figure 1c). Panjaitan et al. (2021) and Wahyuni et al. (2022), states that the completeness of the information presented is not monotonous and easy to understand can help students academically understand the concept of knowledge. According to Arsyad (2019), the material presented in learning media should be able to broaden students' insights and experiences that reflect nonverbalistic learning.

![Figure 2. Presentation of the contents of the encyclopedia: (a) and (b) suitability of the material to the needs of students, (c) completeness of additional information in the encyclopedia (in Bahasa)](image)

**Presentation Aspects**

The presentation aspect consists of five indicators. The first indicator, namely the clarity of the instructions for using the encyclopedia, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the encyclopedia is equipped with easy-to-understand instructions for use (Figure 3a). Instructions for use serve to guide the reader in knowing the contents of the components in the media encyclopedia (Nurmasari et al., 2022) and facilitate the reader in the use of the encyclopedia (Betsi et al., 2018).

The second indicator, namely the order of presentation of encyclopedia material, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the presentation of the material in the encyclopedia has been arranged alphabetically, the description of the material is presented in a sequential, systemic, straightforward, and easy to understand manner. According to Fajriani et al. (2020), presentation of encyclopedia material must be packaged sequentially with sentences that are easy to understand. The information presented in the encyclopedia must be grouped in a good way so that it can help students find information (Pusat Kurikulum dan Perbukuan, 2018).

The third indicator, namely the availability of the index in the encyclopedia, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the index has been completely compiled based on keywords according to the alphabet and equipped with page numbers (Figure 3b). A good encyclopedia is equipped with an index list on the last page of the book, making it easier for students to find information (Pusat Kurikulum dan Perbukuan, 2018). An index arranged alphabetically and equipped with page pointers makes it easier to find information in the encyclopedia (Dewi & Marlini, 2017; Lilis et al., 2016). The fourth indicator, namely there is a bibliography as a reference, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the encyclopedia is equipped with a bibliography which is presented in full according to the source of

information. A good encyclopedia must be accompanied by a bibliography as a reference for information (Pusat Kurikulum dan Perbukuan, 2018). The availability of a bibliography can help students find out the reference sources used (Fajriani et al., 2020; Lilis et al., 2016).

Figure 3. The encyclopedia is equipped with instructions for use and index (in Bahasa)

The fifth indicator, namely as well as illustrations/pictures supporting the contents of the encyclopedia, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the illustrations/images displayed are brightly colored, clearly visible, in accordance with the material being discussed, and can motivate students to read the material. The material in the book which is equipped with various data and facts with actual pictures can help motivate students to understand the material contained (Iskandar et al., 2016).

Language Aspect

The language aspect consists of three indicators. The first indicator, namely a high level of legibility, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the use of words in the encyclopedia is in the form of simple vocabulary and is appropriate to the social context of the reader, does not use too many special (technical) terms, does not use too many foreign terms, and does not have connotative meanings. The second indicator, namely accuracy in using language, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the language used does not have double meanings, is straightforward, ethical, communicative, and understandable. According to Panjaitan et al. (2016), using the right language will make it easier for the reader to understand the intent and meaning of each word used in the media. The third indicator, namely the suitability of the use of language and sentences with the General Guidelines for Indonesian Spelling (PUEBI), obtained a CVR value of 1.00 with a valid category. Asyhari & Silvia (2016) states that the appropriate category in the language aspect is obtained because the language used in the book being developed is a good and correct language in accordance with the applicable rules of the Indonesian language. According to Linda et al. (2021), compliance with the rules needs to be
considered so that the use of each word is appropriate so that it makes it easier for the reader to understand the contents of the material.

**Figure 4.** Presentation of language in the encyclopedia (in Bahasa)

**Graphic Aspect**

The graphical aspect consists of six indicators. The first indicator is the size of the paper used A4 (21.0 x 29.7 cm) in accordance with ISO standards obtained a CVR value of 1.00 with a valid category. According to Asyhari & Silvia (2016), compatible and appropriate size learning media with attractive color combinations, can attract the attention and interest of students to use them. The second indicator, namely the attractiveness of the encyclopedia cover design, obtained a CVR value of 1.00 with a valid category. Based on the validator’s assessment, the encyclopedia cover design has attractive and harmonious colors, represents the contents of the encyclopedia, displays images clearly, has a harmonious layout, and increases reading interest (Figure 5). Book cover illustrations must be able to describe the contents of the book (Pusat Kurikulum dan Perbukuan, 2018). The cover design must have sufficient contrast, good color combinations, and use illustrations that are able to describe the contents of the encyclopedia (Renita et al., 2020; Sulistiyawati & Hedianti, 2016).

**Figure 5.** Encyclopedia front and back cover design (in Bahasa)
The third indicator, namely the attractiveness of the encyclopedia content design, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the contents of the encyclopedia are interesting because they are designed with backgrounds, neat and systematic layouts, and use illustrations that clarify understanding of the material (Figure 6). According to Suryani et al. (2022), visual presentation, varied layouts, and high-quality images produce an attractive and not monotonous appearance. The fourth indicator, namely the display of illustrations of disturbances and disorders of the circulatory system in the encyclopedia, obtained a CVR value of 1.00 with a valid category.

![Figure 6. The attractiveness of encyclopedia content design (in Bahasa)](image)

The fifth indicator is the appearance of images of antihypertensive plants in the encyclopedia, a CVR value of 1.00 is obtained in the valid category, based on the validator's assessment, the display of images in the encyclopedia is not broken, not blurry, the color of the illustration is in accordance with reality (natural), and easy to understand. According to Sulistiyawati & Hedianti (2016) and Anggraini et al. (2022), images that are presented clearly and in color can make students interested and motivated to read further the material presented so that learning material is conveyed effectively. The sixth indicator, namely the typography used is easy to read, obtained a CVR value of 1.00 with a valid category. Based on the validator's assessment, the typography used does not use too many fonts, the letters used are easy to read and understand, and use variations to differentiate and get a combination of letter appearance. Based on the guide to writing a reference book (Pusat Kurikulum dan Perbukuan, 2018) the typography used in the encyclopedia must be simple, easy to read and understand. The selection and use of letters in making learning media must pay attention to readability and legibility so that information or learning material is easily captured and understood by students (Iskandar et al., 2016; Lilis et al., 2016). According to Kartika (2015), the suitability of the use of letters affects the readability of the media so that the media is easy for readers to read.

**Conclusion**

Based on the results of research that has been carried out by researchers, the result of validation showed values in categories valid in terms of content, presentation, language, and graphics. It can be concluded that encyclopedia of circulatory system diseases and disorders based on traditional medicinal plants for hypertension was feasible to use as a learning media.
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