

## DEVELOPMENT OF ENCYCLOPEDIA ON AMPHIBIA MATERIAL AS SUPPLEMENTARY TEACHING MATERIAL FOR CLASS X

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**Abstract.** This study aims to develop Amphibia encyclopedia teaching materials to support the learning process on the material of classification of living things so that it can be used to help students observe and identify the types of Amphibia. This development research uses the Plomp Model with the stages of preliminary study, prototype, and assessment. The data collection instrument is a validity, feasibility, and convenience questionnaire with answer options using a Likert scale and processed using the percentage formula. Based on the encyclopedia development assessment, the results validity test were found to be very valid (92.54%) and very feasible for the one-on-one test (88.61%) and for the small group test (92.22%). Based on the results of the encyclopedia development test on Amphibia material, additional teaching material for class X SMA/MA can be used in the learning process because it has met the criteria for validity and the feasibility of using teaching materials.

**Keywords:** amphibia; encyclopedia; classification; teaching materials

### INTRODUCTION

Learning activities need textbooks because they are a medium for students to get knowledge and teachers' tools to provide skills and develop students' abilities (Yao et al., 2022). However, the problems that are often encountered by teachers only use existing textbooks (Windarti et al., 2018), because teachers have difficulty taking the time to prepare textbooks on the basis of a lot of activities, so there are still teachers who do not have them (Wahyudi, 2022). Teachers must have a teaching guide (Magdalena et al., 2020) and be able to design or compile textbooks that play a role in determining the success of the learning process (Kusumam et al., 2016), because in addition to being a guide for students in learning activities, it is also a reference (Aisyah et al., 2020), both as a main and secondary source, which significantly affects learning outcomes (Akbar et al., 2025).

Based on the results of distributing questionnaires on the availability of science-biology learning resources in November 2024 with biology teachers of class X SMAN 2 Palembang Agam Regency, West Sumatra, for the learning process of Classification of Living Things, teachers and students use several learning facilities, namely textbooks, YouTube videos, and websites as biology learning resources, and need laboratory tools and materials to support the process of observing living things in the environment around the school. During the observation, it was found that teaching materials were less supportive for learning objectives, and there were insufficient laboratory tools and materials to help observations in the field or observation of objects in the laboratory. In the learning process, teaching materials are needed as instructions for students in learning activities and as a reference (Aisyah et al., 2020). If the student learning facilities available at school are incomplete, it will make the learning process not optimal, hampered, or even not

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carried out (Bramanda et al., 2023), but adequate facilities allow learners to explore, collaborate, and develop their skills in an effective way (Silvana et al., 2024), and teachers play an important role as the facilitator of learning (Wirtati et al., 2025).

After the analysis of the content of the textbook used by the teacher, it was found that some of the material for the classification of living things did not have the breadth of the characteristics of living things, had no examples of species, and failed to convey the role of living things at the class level. The limited breadth of material and the lack of examples of material concepts in teaching materials can result in students not achieving the criteria for achieving the learning objectives for the classification of living things.

To minimize the learning problems of the Classification of Living Things material, an encyclopedia was developed, specifically on Amphibia material. The development of this encyclopedia aims to enable students to observe the characteristics of Amphibia with the presence of images in the form of Amphibia photography photographed in their natural habitat while on the move so as to give a contextual impression to the encyclopedia. Because learning the material of classification of living things, students need direct observation of objects so that students can see the characteristics to be classified according to the taxon. The more real the object observed, the easier the classification of living things for students to learn. So context is needed in learning so that students' learning experience is more meaningful, because learning that is relevant to the social context of everyday life must be a medium of learning (Suryawati & Osman (2018), which aims to teach students to understand learning that is related to real life (Haryanto & Arty, 2019). With this perception, students will easily understand the material on the classification of living things.

The designed encyclopedia has a unique structure compared to the literature used as other learning resources, where the encyclopedia has content dominated by images of the objects studied and full color, the material presented is the essence, with a number of phenomena that attract the attention of the reader (Manurung et al., 2023). The unique content of teaching materials is designed in such a way because to achieve certain goals, the systematic way of delivery is adjusted to the characteristics of the students who use it. Encyclopedia can improve student understanding because it makes it easier for students to understand the material in the learning process so as to create a fun learning process (Malikah & Jannah, 2023; Noviyanti et al., 2022; Mulyani & Armia, 2021). The study contributes to the development of teaching materials that are aligned with the needs of students and the curriculum.

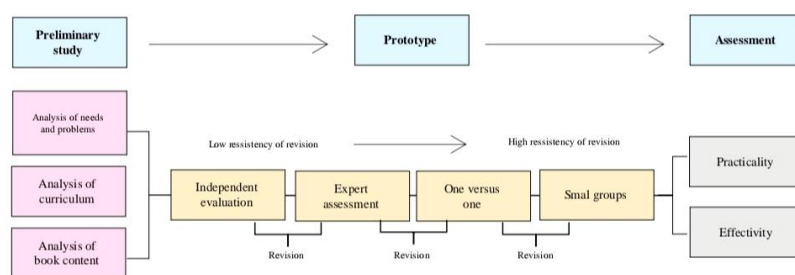
## METHOD

This study was classified as development research, with the Plomp Model consisting of three stages: preliminary study, prototype, and assessment (Plomp & Nieveen, 2013). The research was conducted to the prototype stage, which is up to the feasibility aspect of the product. This research was conducted in January-September 2024 at SMA N 2 Palembang Agam Regency with the subject of class X, 50 students for validation, one-on-one, and small groups.

The preliminary research begins with learning needs and problems to analyze biology learning problems by using a structured interview questionnaire and a teacher and student response questionnaire to Class X Science-Biology learning problems, with the number of respondents being 1 teacher and 103 students. In the students' analysis stage, researchers evaluated students' characteristics. Using the book reference "Better Understanding the Concepts and Processes of Learning

Implementation and Practice in the classroom" (Kurniasih & Sani, 2017). The analysis of curriculum content was carried out by looking at the curriculum currently used with the curriculum being taught and then comparing the two of them. Then the content analysis of class X SMA/MA books was carried out, analyzing the contents of the Puspaningsih *et al.* (2021) science book and the Biological Science book by Imaningtyas & Sagita (2022) regarding (1) conformity with the independent curriculum, elements, and learning outcomes on biodiversity material; (2) the depth of material in the book, which can be seen from the pictures, tables, and graphs presented; (3) the breadth of material seen from the concept, factual, and procedural; and (4) the recency of material that raises current material.

The prototyping stage, creating Amphibian Class encyclopedia teaching materials as additional teaching materials for class X SMA/MA biodiversity material. Design the Amphibian Class encyclopedia. The components of the encyclopedia, according to Handayani *et al.*, (2021), systematize the preparation of the encyclopedia, including the cover, encyclopedia drafting team, preface, table of contents, introduction, contents, bibliography, cover, and author biography. The design results were evaluated by means of self-evaluation, which is by independently revising the encyclopedia that has been designed with a self-evaluation correction questionnaire for appearance, layout, content, and presentation of material. Furthermore, the revision of prototype 1 was carried out by consulting with lecturers (validators) with the aim that the Amphibian class encyclopedia produced was valid and could be further tested by validity testing using content, linguistic, didactic, and graphical validity questionnaires. Prototype revision 2 conducted a one-to-one trial by asking 3 students to read and evaluate using an instrument (Feasibility Questionnaire) to see the feasibility of low, medium, and high levels represented by students with these abilities. Prototype revision 3: a small group evaluation was conducted to analyze the feasibility of the Amphibian Class encyclopedia that had been developed with a total of 6 students. The steps of the Plomp model can be seen in Figure 1.



**Figure 1. Diagram research and development flowchart modified from Plomp Akker *et al.*, (2013)**

The validation/feasibility/ease value determination from the formula proposed by Riduwan (2013), which is

$$x = \frac{\text{total score obtained}}{\text{total maximum score}} \times 100\%$$

x = validity/feasibility

**Table 1. Results of average of validity criteria and feasibility**

| Score criteria (%) | Kategori     |                 |
|--------------------|--------------|-----------------|
|                    | Validity     | Feasibility     |
| 81–100             | Very Valid   | Very feasible   |
| 61–80              | Valid        | Feasible        |
| 41–60              | Valid enough | Feasible enough |
| 21–40              | Less Valid   | Less feasible   |
| 0–20               | Invalid      | Not feasible    |

Modified from Riduwan (2013)

## RESULTS AND DISCUSSION

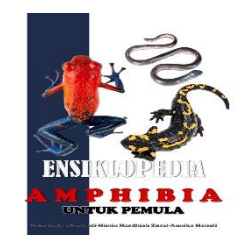
The Amphibia Encyclopedia was developed with a preliminary study stage with encyclopedia components modified, organized, and integrated with contextual nuances of Amphibia material. Handayani et al.,(2021) stated that the following is the design of the Amphibia Class encyclopedia: (1) Cover, (2) Biography of the author, (3) Calendars, (4) List of encyclopedias (table of contents, list of images) (5) Introduction to the encyclopedia (origin of species, origin of amphibia, phylogeny of amphibia, family and species of amphibia, body shape of amphibia), (6) Encyclopedia material (order, family, characteristics, classification, habitat, and role), and (7) Bibliography. At this phase, the encyclopedia assessment was obtained by three lecturers to test the validity of the product developed, and the results can be seen in Table 2.

**Table 2. Results of amphibia encyclopedia validator assessment**

| No.     | Aspects     | JI | Validator Score |    |    | SP         | SM | NV (%) | Validity Criteria |
|---------|-------------|----|-----------------|----|----|------------|----|--------|-------------------|
|         |             |    | V1              | V2 | V3 |            |    |        |                   |
| 1       | Contents    | 12 | 51              | -  | -  | 51         | 60 | 85     | Very valid        |
| 2       | Linguistics | 5  | 22              | 25 | 24 | 71         | 75 | 94.67  | Very valid        |
| 3       | Didactics   | 7  | -               | 34 | -  | 34         | 35 | 97.14  | Very valid        |
| 4       | Graphics    | 12 | -               | -  | 56 | 56         | 60 | 93.33  | Very valid        |
| Average |             |    | 92.54           |    |    | Very valid |    |        |                   |

Ket: V1 = Validator score, A, V2 = AM, V3 = Z, SP : Earned Score, SM: Maximum Score, NK: Eligibility Score.

The results of the validity test are presented in Table 2 with an average of 92.54% and all aspect criteria are very valid. A preview of the encyclopedia prototype can be seen in Figure 2.



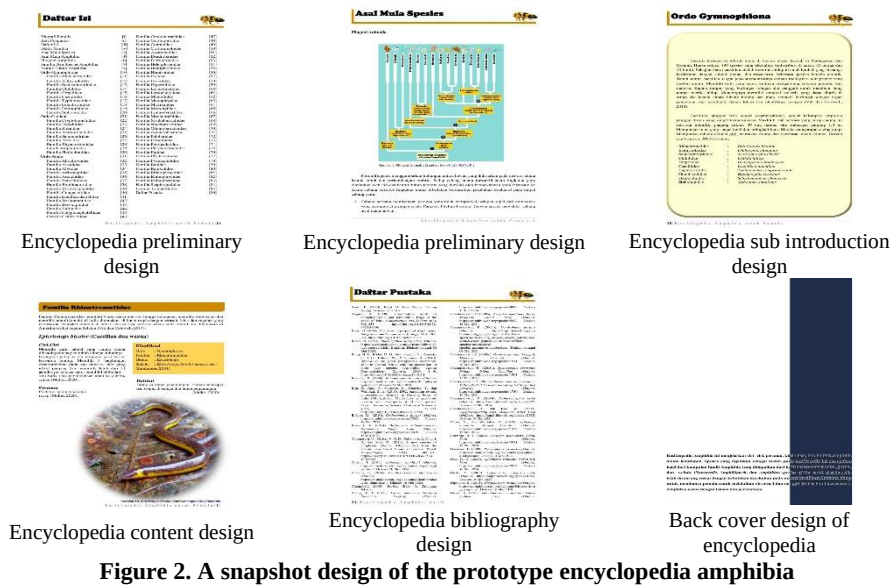
Encyclopedia cover design



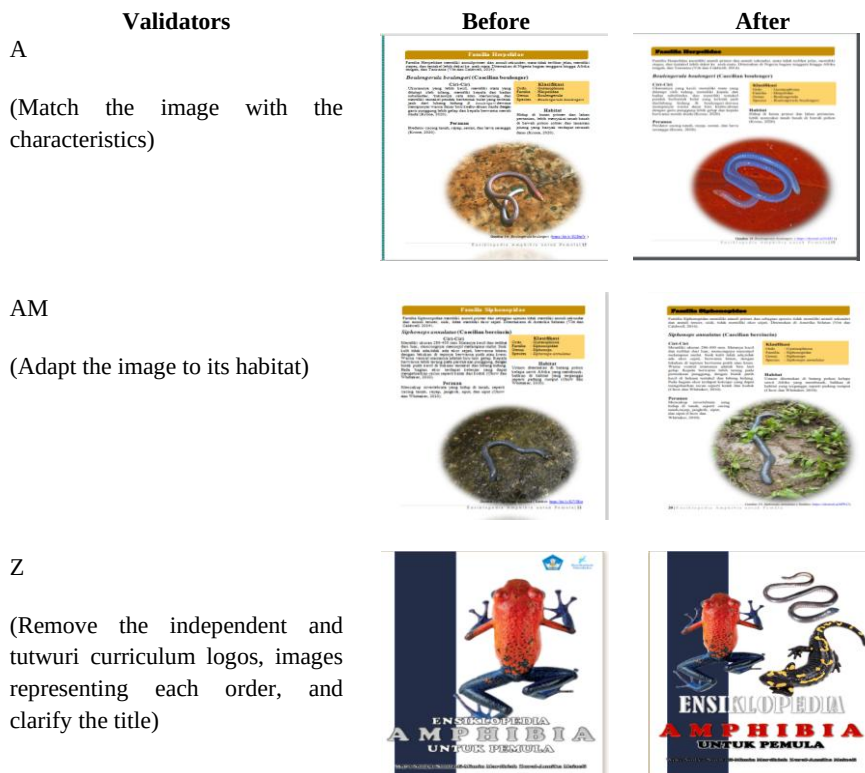
Encyclopedia author biography design



Desain pendahuluan ensiklopedia



**Figure 2. A snapshot design of the prototype encyclopedia amphibia**



**Figure 3. A snapshot of the prototype of the validator's revision**

Evaluation of the encyclopedia with very valid shows that the description of amphibian material is in accordance with the learning objectives, and the encyclopedia developed displays facts from trusted sources for the characteristics,

classification, habitat, and role of the material in accordance with the learning objectives in the curriculum. The amphibian encyclopedia has presented the material systematically and is relevant to the habitat, facilitating the learning process for students. Kristina et al., (2023) reported that teaching materials contain material that is systematically organized to facilitate students in search of information and facilitate student understanding. Students can achieve learning objectives and attain competencies and ensure that the information obtained can be easily applied in learning. According to Magdalena et al. (2020), teaching materials are arranged in an organized manner following the learning objectives and the applicable curriculum.

The assessment of the linguistic aspects of the encyclopedia is very valid. The encyclopedia has used language that is easily understood by students according to their level of understanding, which can be seen in the ability of students to understand the material presented. According to Sarah & Hindun (2022), language rules that must be considered are spelling, meaning, and vocabulary (including terms). In addition, the language used must include words to match the students' level of language development. It is easier for students to understand the material if the language used is relevant. Reported that Madina et al., (2016), proper spelling rules include the use of letters, numbers, and alphabets, word writing, and punctuation.

The assessment of the didactic aspects of the encyclopedia is very valid; the material presented in the encyclopedia developed based on studies arranged sequentially according to the KKTP amphibians, where the preparation of this encyclopedia contains facts that are in accordance with the real situation and presents complete information in the form of images, classifications, characteristics, habitats, and roles so that students can understand the illustrative characteristics of the encyclopedia that can help students in understanding the material properly. Napitupulu et al., (2023) found that the use of image media can increase student motivation and interest. According to Mirnawati (2020), images are media that display clear ideas, information, or concepts that can help students achieve learning goals and provide stimulation.

The assessment of the encyclopedia's graphical aspects is very good, meaning that the encyclopedia developed has an attractive, appropriate, and consistent design. The development of an encyclopedia with an attractive design in terms of design, images, colors, cover, serif font size, and layout. For the cover, Bernard Cooper, size 70-16 pt, image size 14 cm. Using A4 120 gsm double glossy paper. The cover on the encyclopedia can increase student enthusiasm and improve the learning atmosphere in the classroom. In addition, large and consistent images can be a guide that helps students understand the features. According to Magdalena et al., (2020), compiling teaching materials, the consistency of fonts, spaces, and punctuation must be consistent. According to Mentari & Harahap (2018), in compiling teaching materials, it is necessary to pay attention to the color in the presentation of learning resources. Clear image display, not blurry or broken, and appropriate image captions and clear sources will help create a pleasant atmosphere for readers through designs that describe the material very well.

The assessment was then carried out in the one-on-one and small group stages. In this phase, an assessment was obtained in terms of the appearance and color of the images, type and size of letters, layout, presentation of material, language, and appearance of the encyclopedia presented in Tables 3 and 4.

**Table 3. Results of the feasibility of the amphibia class encyclopedia one-to-one assessment**

| No             | Aspects                      | JI | Student Score |    |    | SP                   | SM | NK (%) | Criteria      |
|----------------|------------------------------|----|---------------|----|----|----------------------|----|--------|---------------|
|                |                              |    | SI            | S2 | S3 |                      |    |        |               |
| 1              | Picture color and appearance | 2  | 10            | 8  | 8  | 26                   | 30 | 86.67  | Very feasible |
| 2              | Font type and size           | 1  | 4             | 5  | 4  | 13                   | 15 | 86.67  | Very feasible |
| 3              | Layout                       | 1  | 5             | 5  | 4  | 14                   | 15 | 93.33  | Very feasible |
| 4              | Presentation of material     | 4  | 18            | 17 | 16 | 51                   | 60 | 85     | Very feasible |
| 5              | Language                     | 1  | 5             | 4  | 5  | 14                   | 15 | 93.33  | Very feasible |
| 6              | Encyclopedia view            | 2  | 9             | 7  | 10 | 26                   | 30 | 86.67  | Very feasible |
| <b>Average</b> |                              |    | <b>88.61</b>  |    |    | <b>Very feasible</b> |    |        |               |

Description: JI: Number of Items, S1, S2, S3: Student 1, Student 2, Student 3. SP: Acquisition Score, SM: Maximum Score, NK: Eligibility Score.

**Table 4. Results of the feasibility test of the amphibia class encyclopedia small group assessment**

| No             | Aspects                      | JI | Student Score |    |    |    |    |    | SP                   | SM  | NK (%) | Criteria      |
|----------------|------------------------------|----|---------------|----|----|----|----|----|----------------------|-----|--------|---------------|
|                |                              |    | SI            | S2 | S3 | S4 | S5 | S6 |                      |     |        |               |
| 1              | Picture color and appearance | 2  | 5             | 10 | 10 | 10 | 10 | 10 | 55                   | 60  | 91.67  | Very feasible |
| 2              | Font type and size           | 1  | 4             | 5  | 5  | 4  | 5  | 4  | 27                   | 30  | 90     | Very feasible |
| 3              | Layout                       | 1  | 2             | 5  | 5  | 5  | 5  | 5  | 27                   | 30  | 90     | Very feasible |
| 4              | Presentation of material     | 4  | 19            | 19 | 20 | 20 | 20 | 20 | 118                  | 120 | 98.33  | Very feasible |
| 5              | Language                     | 1  | 4             | 5  | 4  | 5  | 5  | 4  | 27                   | 30  | 90     | Very feasible |
| 6              | Encyclopedia view            | 2  | 8             | 10 | 10 | 10 | 10 | 8  | 56                   | 60  | 93.33  | Very feasible |
| <b>Average</b> |                              |    | <b>92.22</b>  |    |    |    |    |    | <b>Very feasible</b> |     |        |               |

Description: JI: Number of Items S1, S2, S3, S4, S5, S6: Student 1, Student 2, Student 3, Student 4, Student 5, Student 6. SP: Acquisition Score, SM: Maximum Score, NK: Feasibility Score.

At the revision 2 and 3 prototype stages, feasibility tests were conducted, one-on-one (Table 3) and in small groups (Table 4), obtaining very feasible results with an average of 88.61% (one-on-one) and 92.22% (small group) with aspects of type and font size, presentation of material, and appearance of the Amphibia Class encyclopedia and all aspect criteria are very feasible.

The assessment of the readability aspect of very feasible results shows that the encyclopedia developed has an attractive image and color display to read, the type of size and font that is suitable for reading, and the layout of the margins that are organized. The flexible layout makes students pay more attention and facilitates students' understanding of the use of encyclopedias. Based on Solahudin's statement (2022), so that students have an interest in reading, several things are needed, including finding books or reading materials according to their needs and interests. According to Zural et al., (2024), the selection of attractive colors in accordance with the composition so as not to make students bored while learning.

Mulyani and Armianti (2021) encyclopedias can learn students' understanding because they make it easier to understand the material, increase motivation in

participating in the learning process, and create interesting and enjoyable learning experiences for students, for example, by using interesting pictures. According to Habiba et al., (2023), the images presented in the encyclopedia create an interesting and contextual atmosphere for students, thus increasing student interest and motivation in the learning process. According to Wijarini & Zulfadli (2018), images or photos in the encyclopedia will provide clear visualization. Also, encyclopedia can improve critical thinking skills from the images observed (Hernawati et al., 2018).

## CONCLUSION

The encyclopedia can be used as a guide for teachers and students in learning activities on the classification of living things, especially in the Amphibia Class, from the value of validity, feasibility, and convenience in use.

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