QUANTUM: Jurnal Inovasi Pendidikan Sains, Vol. 16, No. 2, 277-290
p-ISSN : 2086-7328 e-ISSN : 2550-0716
Website: https://ppjp.ulm.ac.id/journal/index.php/quantum/index
DOI: 10.20527/quantum.v16i2.21656

ENCYCLOPEDIA OF AVES AS SUPPLEMENTARY LEARNING MATERIAL FOR GRADE X SENIOR HIGH SCHOOL

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Abstract. This study aims to develop Aves 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 Aves in Indonesia. This development research uses the Plomp Model with the stages of preliminary study, prototype, and assessment. The research results reported are from the prototype stage. 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 were found to be very valid (93.7%) and very feasible for the one-to-one test (82.5%) and for the small group test (92.36%). Based on the results of the encyclopedia development test on Aves material, it can be used as additional teaching material for class X SMA/MA and can be used in the learning process because it has met the criteria for validity and the feasibility of using teaching materials.

Keywords: aves, encyclopedia, teaching materials

INTRODUCTION

The learning process in today's education era aims to develop students' hard and soft skills. Dahlia et al., (2024) stated the importance of integrating soft and hard skills for a more holistic and effective learning strategy. Learning can be defined as two-way communication between teachers and students. If teachers can communicate effectively, students are expected to understand the material. The interaction between students and their environment aims to create positive behavioral change (Zendrato, 2016). The interacting components are the teacher, teaching materials, and students (Abdullah, 2017).

Classification of living things is one of the subtopics of biodiversity studied in grade X of high school. It discusses the characteristics of living things, their habitats and roles in their ecosystems, and the grouping of living things into their taxa. To enable students to meet their learning objectives, the teaching materials provided by teachers should provide the characteristics of examples of living things for each taxon, complete with images of the living things and their roles. This is because teaching materials are created to achieve the desired goals, namely achieving competencies or sub-competencies with all their complexities (Muzayanah, 2020), which present a complete picture of the competencies that students will master and are used in the learning process with the aim of planning and reviewing learning implementation (David & Mustika, 2021). Without teaching materials, the teacher-student interaction process will be limited, especially in the delivery of learning materials (Djono, 2023).

Based on the results of an interview in January 2024 with a Class X biology teacher at SMA Negeri 1 Bonjol, Pasaman Regency, West Sumatra, it was found that there are several student learning resources used to study biodiversity material, namely biology science textbooks that can be borrowed by students from the school

Published by: Program Studi Pendidikan Kimia FKIP Universitas Lambung Mangkurat
How to Cite: Zural, M. M., Amanda, S., Nurhadi, N., & Maizeli, A. (2025). Encyclopedia of Aves as Supplementary Learning Material for Grade X Senior High School. *QUANTUM: Jurnal Inovasi Pendidikan Sains*, *16*(2), 277–290. http://dx.doi.org/10.20527/quantum.v16i2.21656.

Article History:
Received : 17-01-2025, *Accepted* : 25-10-2025, *Published* : 31-10-2025

library and biodiversity modules from MGMP. However, the number of textbooks in the library is limited, and the module does not cover the classification of living things, making the teaching materials ineffective. This can affect student literacy, as the material on the classification of living things requires students to have the ability to remember and classify living things into their respective taxa based on characteristics. In addition to book availability, teachers should provide contextual learning, as it makes it easier for students to understand the material. However, the teacher has not implemented contextual learning and hasn't given observation assignments related to observing the characteristics of living things in their environment. Meanwhile, Yasin et al., (2023) stated that contextual learning makes learning more efficient when students discover what they learn on their own rather than through the teacher, and Suryawati & Osman (2018) suggested providing opportunities for students to explore through relevant activities that enable them to build meaningful conceptual understanding.

Therefore, there are several obstacles for students in understanding the classification of natural and artificial systems. This is evidenced by the results of the distribution of student response questionnaires regarding the availability of science-biology learning resources, where 72.83% of students had difficulty understanding the material on the classification of living things, 37.84% had difficulty stating scientific names, and as many as 50.84% had difficulty grouping animals into taxa based on their characteristics.

Based on the analysis of the content of the Natural Science book for SMA Class X and the Biology book for SMA/MA Class X, the material on the classification of living things has met the learning objectives but lacks depth. The learning objective of this material is for students to classify living things into their respective taxa. The chapter's content is generally good for the learning process. However, it should be noted that animals in the Kingdom Animalia are highly varied and grouped into 9 phyla, from Porifera to Chordata, resulting in diverse characteristics, roles, and habitats. Therefore, in addition to textbooks and teacher-designed materials, supplementary teaching materials are needed to provide students with more meaningful learning experiences. An encyclopedia is a suitable supplementary material to support the learning process on the classification of living things. According to Noviyanti et al., (2022), Mulyani & Armiati (2021), and Rostikawati et al., (2019), encyclopedia-based teaching materials can improve learning outcomes, foster motivation and reading interest, and increase students' knowledge and insights. This is because encyclopedias are presented with appropriate images and a well-designed layout, making it easier for students to understand the material and become more enthusiastic about the learning process.

Developing an encyclopedia on Aves as a supplementary teaching material for Class X SMA/MA students is crucial. It not only supports learning but also showcases Indonesia's rich biodiversity, especially in the animal kingdom. This encyclopedia can introduce students to various animal species found in Indonesia and globally.

METHOD

The type of research to be conducted was development research (Research and Development) using the Plomp model. The Plomp model consists of three stages: the preliminary research phase, the prototyping phase, and the assessment phase.

The preliminary study began with identifying learning needs and problems, analyzing curriculum content, and analyzing the content of biology textbooks for Class X SMA/MA. To gather basic information on learning problems, observations of the learning process and interviews with teachers and students are conducted.

Curriculum analysis involved examining the current curriculum and comparing it with the school's curriculum. Content analysis of textbooks was done by analyzing the material on the classification of living things in the book used by teachers, with aspects of analysis including (a) alignment with learning outcomes, elements, and learning objectives; (b) breadth of material in relation to learning outcomes; (c) depth of material based on images, tables, and graphs presented; and (d) factual, conceptual, and procedural content, as well as current material. The book analyzed is the Natural Science textbook written by Puspaningsih et al., (2021).

Next, the prototyping phase was carried out, which is an iterative design phase aimed at improving and perfecting the product. Then, a validation test was conducted with validators to assess the validity of the content, language, didactic, and graphic aspects of the Aves Encyclopedia. After the teaching material had been validated, it was proceeded to prototype revision 1, which involved a feasibility test by individuals, specifically 3 students with different abilities (high, medium, and low). This was followed by prototype revision 2, which involves a small group feasibility test with six randomly selected students. The steps of the Plomp model can be seen in the diagram in Figure 1.

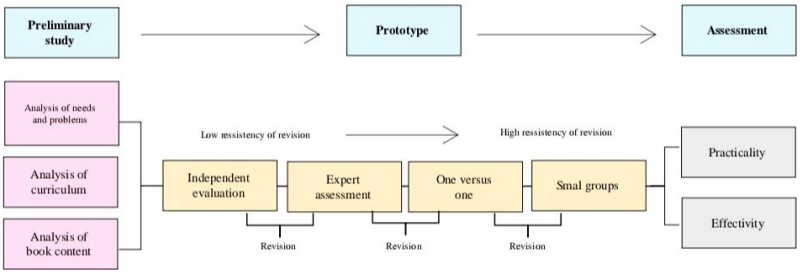


Figure 1. Research and development flowchart modified from Plomp's Model

Validity and feasibility assessments were conducted using a validity questionnaire and a feasibility questionnaire. The questionnaire was structured with statements using a Likert scale. The data in this study were processed using a modified percentage formula from Riduwan (2013), and entered into the validity/feasibility criteria according to Table 1. The results of the validity and feasibility data processing were then analyzed descriptively.

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

x= Validity/feasibility

Table 1. Validity criteria, and feasibility of the developed encyclopedia

Score criteria (%)	Category	
	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 Aves Encyclopedia was developed based on a preliminary study. The components of the encyclopedia were modified from Handayani et al., (2021) and

arranged with a contextual nuance. The following is the design of the Aves Encyclopedia: (1) cover, (2) Author Biography, (3) Encyclopedia List containing a table of contents, a list of images, (4) Introduction to the Encyclopedia containing the origin of species, the origin of Aves, Aves phylogeny, Aves families and species, and Aves beak and foot shapes; (5) Encyclopedia Material containing orders, superfamilies/families, characteristics, classification, habitats, and roles; and (6) Bibliography.

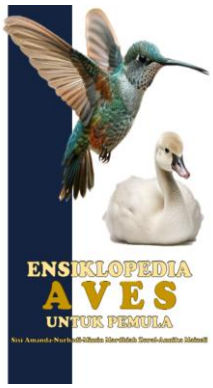
The design results were self-evaluated to correct design errors, and then the product was assessed by a validator. The validation scores for the Aves Encyclopedia for grade X SMA/MA can be seen in Table 2.

Table 2. Results of the aves encyclopedia validator assessment

No	Aspect	JI	Validator Scores			OS	MS	VV (%)	Criteria
			V1	V2	V3				
1	Contents	12	53	-	-	53	60	88.33	Very valid
2	Linguistics	5	23	24	25	72	75	96	Very valid
3	Didactics	7	-	34	-	34	35	97.14	Very valid
4	Graphics	12	-	-	56	56	60	93.33	Very valid
Total								374.8	
Average								**93.7**	**Very Valid**

Description: V1= content validator , V2= didactics validator, V3= learning media validator, OS= obtained score, MS = maximum score, VV = validity value

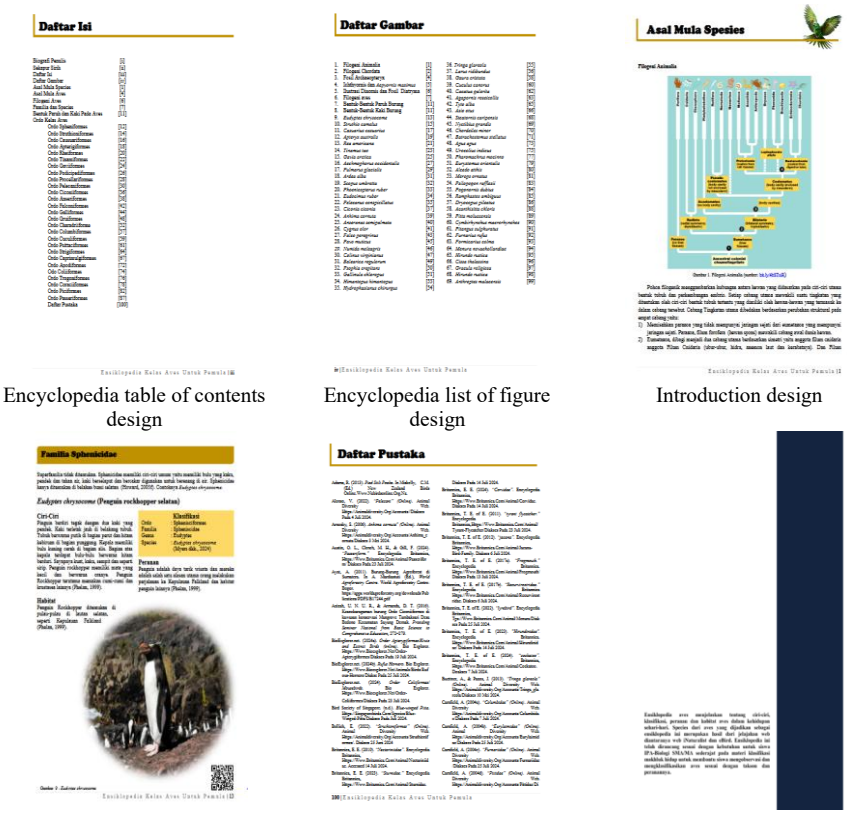
The results of the validity test are presented in Table 2, with a rating range of 88.33–97.14%, with an average of 93.7%, and all assessment aspects highly valid. A snapshot of the Aves Encyclopedia prototype can be seen in Figure 2.



Encyclopedia cover design

Encyclopedia author biography design

Encyclopedia foreword design



Encyclopedia table of contents design | Encyclopedia list of figure design | Introduction design

Encyclopedia content design | Encyclopedia bibliography design | Encyclopedia back cover design

Figure 2. A screenshot of the aves encyclopedia prototype

The assessment of the encyclopedia's content aspect, with the highly valid criteria, indicates that the description of Aves material aligns with the learning objectives developed from TP 7.2. The encyclopedia presents facts from reliable sources for characteristics, classification, habitat, and roles, which align with the curriculum's learning objectives. According to Andini et al., (2024), the teaching materials are comprehensively structured, covering all learning competencies stipulated in the curriculum. Based on these assessment results, the encyclopedia can be further tested at the one-to-one stage.

The assessment of the linguistic aspects of the encyclopedia with a very valid assessment shows that the language used is in accordance with the Indonesian spelling (EBI) and the grammar is arranged with simple and effective sentences, in line with the opinion of Zural et al., (2024), that students' understanding of the material is influenced by the use of simple language in teaching materials so that learning messages become efficient and show clear language use. Based on the findings of Aji et al., 2024, language efficiency can be realized by using appropriate words, designing clear sentence structures, and conveying messages consistently.

The assessment of the didactic aspect of the encyclopedia with a very valid assessment indicates that the material presented in the encyclopedia is developed based on study materials arranged sequentially according to the aves kktp, where the compilation of this encyclopedia includes facts that are in accordance with real situations and presents complete information in the form of images, characteristics, classifications, habitats, and roles. Based on Mirnawati's statement (2020) where

images are a medium that combines facts and ideas clearly and strongly through a combination of words and images. Image media functions to provide stimulus in conveying messages and information to readers by using the sense of sight so that it can be used to help encourage students to increase their interest in the lesson.

The assessment of the encyclopedia's graphical aspects with very valid criteria shows that the developed encyclopedia has an attractive, appropriate, and consistent design. The main design of the encyclopedia consists of images that clearly describe characteristics and habitats and has an appropriate color display, cover, size, font, and layout. In accordance with the opinion of Magdalena et al., (2020), the preparation of teaching materials must pay attention to consistency such as the use of fonts, spacing, and layout.

After validation and revision, the aves encyclopedia was further tested for readability. The readability aspect consists of six indicators with 11 questions. The results of the individual and small group tests for the Aves encyclopedia are presented in Tables 3 and 4.

Table 3. Results of the Individual Test for the aves encyclopedia

No	Aspect	JI	Student Score			OS	MS	ES (%)	Criteria
			S1	S2	S3				
1	Picture color and appearance	2	10	8	9	27	30	90	Very feasible
2	Font type and size	1	5	3	3	11	15	73,33	Feasible
3	Layout	1	5	4	4	13	15	86,66	Very feasible
4	Presentation of material	4	16	15	14	45	60	75	Feasible
5	Language	1	5	4	5	14	15	93,33	Very feasible
6	Encyclopedia view	2	10	8	5	23	30	76,66	Feasible
	Total							494,98	
	Average							**82,5**	Very feasible

Description: JI: Number of Items, S1, S2, S3: Student 1, Student 2, Student 3. OS: Obtained Score, MS: Maximum Score, ES: Eligibility Score.

Table 4. The results of the feasibility test of the amphibia class encyclopedia small group assessment

No	Aspect	JI	Student Score						SP	SM	NK (%)	Criteria
			S1	S2	S3	S4	S5	S6				
1	Picture color and appearance	2	10	10	10	8	6	10	54	60	90	Very feasible
2	Font type and size	1	5	5	5	4	4	5	28	30	93,33	Very feasible
3	Layout	1	5	5	5	5	3	5	28	30	93,33	Very feasible
4	Presentation of material	4	18	20	20	15	15	19	107	120	89,16	Very feasible
5	Language	1	5	5	5	5	3	5	28	30	93,33	Very feasible
6	Encyclopedia view	2	10	10	10	9	8	10	57	60	95	Very feasible
	Total										554,15	
	Average										**92,36**	Very feasible

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: Eligibility Score.

The results of the feasibility test shown in Tables 3 and 4, obtained very feasible criteria where the assessment ranged from 73.33-76.66% with aspects of type and letter writing, presentation of material, and encyclopedia display with feasible criteria, a range of 86.66-93.33% with aspects of image display and color, layout, and language with very feasible criteria; and an average of all aspects of 82.5% with very

feasible criteria. Then the range of 89.16-95% with an average of 92.36% and all aspects of the assessment were very feasible.

The feasibility test of the Aves encyclopedia includes an attractive appearance and color of images, appropriate font type and size, layout, easy and clear presentation of material, language used that is easy to understand, and an attractive and easily recognized encyclopedia appearance. This agrees with Yuliana (2023) that increasing students' interest in reading requires several factors, including a supportive environment, interesting reading materials, and reading guides that are appropriate for their age. One of the interesting teaching materials based on the findings of Rohmah et al., (2020) is an encyclopedia. Encyclopedia teaching materials are interesting and easy-to-understand learning resources because they are accompanied by attractive colored images. The presence of these images makes readers not easily bored and actually become more interested in reading.

CONCLUSION

Based on the results of this study, it can be concluded that the Aves Encyclopedia can assist and facilitate learning activities in terms of validity, feasibility, and ease of use. The encyclopedia meets the criteria of being highly valid and highly suitable for use in learning activities. This encyclopedia was developed because, in addition to meeting learning needs, Indonesia is also known for its high biodiversity of animalia. Therefore, the encyclopedia, in addition to being a supplementary teaching material, can also introduce students to various types of animals living in Indonesia and around the world.

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