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# Design of an e-encyclopedia of the order of odonata from sumatra as student teaching material

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ABSTRACT

This research discusses the design of the E-Encyclopedia of the Order of Odonata as teaching material for junior high school students. This research aims to introduce how to design an E-encyclopedia of the Order of Odonata from Sumatra which can be used as teaching material for junior high school students, especially children aged (13-15 years) in the Sumatra region. The urgency is that junior high school children become familiar with the various types of the Odonata Order from Sumatra so that the identity of the Odonata Order is maintained and maintained. This research is design research consisting of three phases, namely Preliminary research, Prototyping phase, and assessment phase. The design of the E-Encyclopedia of the Odonata Order from Sumatra is an effort to develop media in studying various types of the Odonata Order from Sumatra whose development is viewed from language, material, and media. Through the development activities carried out, an E-Encyclopedia Product of the Order of Odonata from Sumatra was obtained as suitable teaching material.



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## INTRODUCTION

Along with advances in science and technology today, there are many changes in the mindset of the people of a nation toward a more advanced one. Likewise, learning activities are increasingly varied and related to increasingly advanced science and technology. We can see this with the increasing social and cultural shifts in society as a result of advances in technology and information (Siregar et al., 2020). Biology is one of the subjects discussed at junior high school level whose material is abstract so it requires additional teaching materials or media to accompany textbooks. E-encyclopedias were chosen as a product of this balance because encyclopedias are identical to images, and seem lighter, more interesting, and more concise (Pardosi et al., 2023). Biology subjects require visualization such as pictures or videos that can show very large living creatures or even microscopic living creatures, and also to see natural phenomena that are not found directly in

the classroom. In order, to achieve maximum success in biology learning, learning concepts can be developed by current times, namely with the concept of appropriate teaching materials for students.

The reality in the field is that learning activities have not been fully implemented as expected. Students in active learning should find information related to the material being studied (Ahmad et al., 2022). In an interview conducted by researchers with one of the junior high school teachers in Kolata Labuhan Batu, information was obtained that in teaching biology, teachers tend to use conventional approaches. Where in this case learning is carried out by the teacher explaining the existing material using the lecture method. Next, the teacher gives practice questions and the teacher directs students to memorize the important concepts or material being studied. And it was also conveyed that the teaching materials used in learning were less varied so students' interest in learning tended to be low.

The learning and teaching process requires sufficient teaching materials to be used as a means of interaction between students and teachers and learning to acquire knowledge, skills, and positive values. The role of teaching materials in the learning process is a series of activities to realize student competence (Risti et al., 2017; Sabri et al., 2023). Various teaching materials currently being implemented include E-encyclopedias, Textbooks, Teaching Modules, and LKPD, which can present various meanings, explanations, and questions without being supported by images or photos packaged in print or online media. Interesting learning resources can increase students' understanding so that learning resources can be in the form of an encyclopedia. Encyclopedias can also be used to increase general cognitive knowledge in students (Arifah et al., 2017). Encyclopedias contain content in the form of information on knowledge terms which are not only explained in the form of definitions but also examples. Encyclopedias contain a collection of information that makes knowledge richer. Not only in the form of writing, the encyclopedia contains various images to make the encyclopedia seem interesting. Completeness of the material and several examples of images used as learning media for students (Rosyida et al., 2016). The use of encyclopedias in learning allows students to learn according to their abilities. Students can also find out how far their level of understanding is regarding the material that has been presented (Ismail et al., 2023).

Encyclopedia is taken from "encyclopedia" from Greek which means a complete circle of teaching. Interesting learning resources can increase students' understanding so that learning resources can be in the form of an encyclopedia (Solihah et al., 2022a). Encyclopedias are several writings containing explanations that store information comprehensively and quickly to be understood and understood about all branches of science, generally printed in the form of book summaries depending on the amount of material included (Marantika et al., 2023). An encyclopedia is a reference collection with basic and complete information about science (Safitri & Dewi, 2021). Encyclopedias are very popular reference books (Purbosari, 2016). According to Suwarno, an encyclopedia is a list of subjects accompanied by information about definitions, background, and bibliographic data arranged alphabetically and systematically (Nurhatmi et al., 2015). Encyclopedias contain various kinds of objects accompanied by comprehensive and complete descriptions and information relating to the objects discussed (Prihartanta, 2015). There is a difference between a book and an encyclopedia, namely that an encyclopedia contains a more detailed explanation, alphabetical and systematic in its arrangement. According to (Kemendikbud, 2017) e-modules are independent learning materials that are arranged systematically and presented in electronic format. The advantage of e-modules compared to printed modules is that they are interactive, contain images and animations, and are equipped with formative tests/quizzes which are expected to be able to provide immediate automatic feedback (Permatasari et al., 2017). This e-encyclopedia teaching material is suitable for developing biology subjects that require in-depth

visualization because it can display photos or animated images which can make it easier for students to understand the material.

The material developed in the encyclopedia is material about the order Odonata. One order of insects that has a fairly high terrestrial habitat and diversity and also has a beneficial role for the environment is the Odonata (Rahmawati et al., 2023). Dragonflies are flying insects that prefer habitats close to water sources (Solihah et al., 2022b). Dragonflies (Odonata) have a role in biological control because dragonflies consume insects that are detrimental to humans and livestock, such as mosquitoes, flies, and rice pests (Dwita et al., 2022). Because this can foster a sense of love for the surrounding environment. This is very important because children at the junior high school level can learn the most fundamental things in life, including living creatures found in the area where they live. In introducing the adonata order, utilizing an online media approach in the form of an e-encyclopedia is the solution.

Various previous studies have conducted studies on the Odonata order and have provided useful results for improving the learning process. The results of this research reveal that e-encyclopedias need to be published according to certain regions so that people have basic information in line with development and progress and the increasing need for information (Prihartanta, 2015). Furthermore, an inventory of Odonata in the Roro Kuning Bajulan Loceret Nganjuk waterfall area provided research results that showed that there were three families, namely Calopterygidae, Coenagrionande, and Rhinocypha (Prameswari & Sulistyowati, 2016; Rahmawati et al., n.d.). Furthermore, there has been various research into the development of the Encyclopedia of the Odonata to produce teaching material products that are suitable for teaching biology to students (As'ad et al., 2020; Cahyanti & Ibrahim, 2018; Dawam, 2021; Solihah et al., 2022a). From the previous description, there has been no research that examines the inventory of the order of Odonata from Sumatra, especially if it is discussed for teaching junior high school students. Therefore, the author is interested in researching the Design of the E-Encyclopedia of the Order of Odonata from Sumatra as Teaching Material for Junior High School Students.

## RESEARCH METHODS

### Research Design

This type of research is Design Research, which is a type of research in which the researcher designs learning materials (such as learning activities and learning trajectories) for a particular topic and also builds a theory about the learning process for that topic. The design research method is a systematic and flexible method for improving the quality of learning in the classroom (Muslimin et al., 2020). In this case, the design research aims to formulate, understand, and develop an e-encyclopedia of the order Odonata from Sumatra. The population of this study is the Odonata order from the Sumatran region. Using the purposive sampling method (Sugiyono, 2016), where for reasons of needing new knowledge about the Odonata order in the Sumatra region for junior high school students in North Sumatra, the sample chosen was the Odonata order in the North Sumatra region. Thus, the research subject is the design of the North Sumatran Odonata order and the object is the encyclopedia of the Odonata order from North Sumatra.

Design research consists of three phases, namely preliminary design, experimental design, and retrospective analysis (Cobb et al in Mulyana, 2008). The explanation of the three phases is:

### I. Preliminary Design

Analysis in this case involves analysis and needs assessment carried out to determine the gap between actual and ideal conditions. Where in this research material, biology curriculum, student characteristics, analysis of student analysis work plans, lesson material analysis, task analysis, and learning objective analysis were carried out. The needs assessment was carried out using observation and interview methods. Observations and interviews were carried out to identify products that suit students, learning objectives, core competencies, basic competencies, and learning materials that will

be discussed in the learning media that will be developed. Next, Front-End Analysis is carried out to collect techniques that can be used as solutions to existing gaps. The Front-End Analysis carried out includes an analysis of the approach used in developing textbooks related to the principles, characteristics, and syntax used in the learning approach used. Furthermore, the book developed must refer to developing students' creative thinking abilities. The design stage is the stage of designing the product to be made. The design stage starts with making a research schedule plan, designing research instruments which include language expert assessment sheets, material expert assessment sheets, media expert assessment sheets, and designing an E-Encyclopedia of the Order of Odonata from Sumatra as teaching material for junior high school students. The E-Encyclopedia Order Odonata research product is designed for junior high school students.

### 2. Prototyping phase

This stage involves a design process in which the design of the product to be made is carried out. The design stage starts with making a research schedule plan, designing research instruments which include language expert assessment sheets, material expert assessment sheets, media expert assessment sheets, and designing an E-Encyclopedia of the Order of Odonata from Sumatra as teaching material for junior high school students. The E-Encyclopedia Order Odonata research product is designed for junior high school students.

### 3. Assessment phase

Assessment phase dilaksanakan untuk memperoleh produk berupa E-Ensiklopedia Order Odonata which can be applied to teach junior high school students. This activity is through product validation by material experts and experts in contextual learning approaches. The validation carried out was reviewed from the aspects of language, material, and media. The product obtained in this stage is an e-encyclopedia of the order of adonata which has passed expert validation. If the validator provides suggestions for improvement, improvements will be made so that the product developed meets the validity criteria.

## Instruments

The research instrument involved a product validation sheet. The E-Encyclopedia of the Odonata Order validation sheet. The instrument is designed to obtain assessments and suggestions for improvements to the products being developed. Product assessment and development is focused on 3 aspects which include language, material, and media. Product assessment is through a questionnaire containing statements that are responded to using a Ricard scale with the options "Not Suitable" with a score of 1, "Not Suitable" with a score of 2, "Quite Suitable" with a score of 3, "Suitable" with a score of 4, "Very Suitable" Appropriate" with a score of 5 (Hunaepi et al., 2016). Next, questions are asked regarding the advantages, disadvantages, eligibility status, and suggestions for improvement of each existing validation sheet according to the aspects being validated.

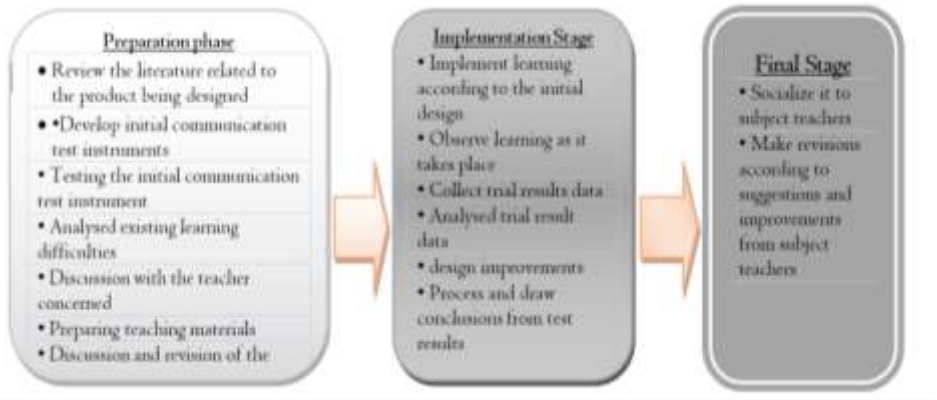


**Figure 1.** Research Procedure Chart

## Procedures

This research procedure was carried out in three stages, namely the preparation stage, implementation stage, and final stage. The detail regarding these three stages are shown in Figure 1.

## Data Analysis

Data analysis in this research uses quantitative descriptive methods. The data obtained based on the validator's assessment of each aspect will determine the average value. Then a categorization is carried out based on the average value obtained to interpret the quality of the product being developed. The criteria for interpreting the quality of the designed research product can be seen in Table 1.

**Table 1.** Interpretation of validator assessment score achievements

| Achievement Score | Interpretation |
|---|---|
| $1 \leq nilai \leq 1{,}5$ | Very bad |
| $1{,}5 < nilai \leq 2{,}5$ | bad |
| $2{,}5 < nilai \leq 3{,}5$ | Enough |
| $3{,}5 < nilai \leq 4{,}5$ | Good |
| $4{,}5 < nilai \leq 5$ | Very good |

Source: Modification (Ahmad, Siregar, & Siregar, 2018)

## RESULTS

Based on the previously determined development model for the Design of the E-Encyclopedia of the Order of Odonata from Sumatra as Teaching Material for Junior High School Students, the development was carried out in stages which included the Preliminary Design, Prototyping phase, Assessment phase (Plomp, 2010).

Preliminary Design defines the need for e-encyclopedia teaching materials as focusing on its use on junior high school students. Development activities aim to develop an E-encyclopedia of the order adonata. Analyze concepts/material by identifying, detailing, and systematically arranging relevant concepts/material to be taught by the initial final analysis. The material involved is related to the Classification of, therefore the author wants to discuss the Morphology of Dragonflies, the Behavior of Dragonflies, the Life Cycle of Dragonflies, the Habitat of Dragonflies, Benefits of Dragonflies, Classification of Dragonflies. Next, an analysis is carried out to analyze the gap between actual and ideal conditions. In this case, it was found that junior high school students were not fully interested in biology lessons, especially the order adonata material. And the teaching materials that support learning activities are not yet varied. The teaching materials used in learning activities should be varied, involving print and electronic media. Print media can be in the form of printed books, printed modules, printed encyclopedias, and others. Furthermore, online or electronic media can be in the form of e-modules, e-encyclopedias, e-books, and others. In this case, innovation is needed in teaching materials in electronic media in the form of e-encyclopedias on Ordo Adonata material.

The prototyping phase is carried out to design the e-encyclopedia product that will be developed. In this stage, the E-encyclopedia product is designed by the provisions found in the definition and analysis stage. This stage produces an initial draft product of the E-encyclopedia. The E-encyclopedia design is presented with an attractive appearance involving concepts, theories, and images that support students' understanding of the existing material presented. Apart from designing the initial draft product, a validation sheet instrument was also designed which included a language expert validation sheet, a media expert validation sheet, and a material expert validation sheet. The validation sheet is designed to contain statements that will be responded to on a Ricard

scale with the options of TS (Not Appropriate) with a score of 1, TS (Not Appropriate) with a score of 2, TS (Quite Appropriate) with a score of 3, TS (Suitable) with a score of 4 , TS (Very Suitable) with a score of 5 (Ahmad, Siregar, Siregar, et al., 2018). Next, questions are asked regarding the advantages, disadvantages, eligibility status, and suggestions for improvement of each existing validation sheet according to the aspects being validated.

The assessment phase is carried out to obtain the final product from the e-Encyclopedia product being developed. This activity was carried out through validation and revision activities in terms of the language, material, and media aspects contained in the design of the e-Encyclopedia of the order of adonata that was developed. This development involved 6 validators who have competence in various predetermined aspects. The validators involved consist of Lecturers, Teachers, and Practitioners who have competence in developing e-Encyclopedia designs.

The development of the language aspect was carried out by 2 validators who have competence in scientific language (Biology). Validation was carried out on aspects of flexibility with 3 items, interactiveness with 2 items, language rules with 3 items, and language accuracy with 3 items. The average value of the assessment results of the two validators is as in Table 2.

**Table 2.** Validation Assessment Through Language Aspects

| No. | Language Aspects of Assessment | Validator | | Average value |
|---|---|---|---|---|
| | | 1 | 2 | |
| 1 | Straightforward | 4,67 | 4,00 | 4,33 |
| 2 | Interactive | 4,50 | 4,00 | 4,25 |
| 3 | Language Rules | 5,00 | 4,00 | 4,50 |
| 4 | Language Accuracy | 4,67 | 4,00 | 4,33 |
| | Total Average Value | 4,71 | 4,00 | 4,35 |

Based on Table 2, it can be seen that the four aspects developed achieved good criteria. Furthermore, from the total average, assessment achievements are also obtained in the good category. Thus, the product assessment achievement in terms of the language aspect is that it meets the effective criteria. The comments from the linguist validator were that the product developed was generally straightforward to understand. Furthermore, there were shortcomings where foreign spelling should be written in italics. The comments and suggestions provided are used as a reference to improve the research products being developed. In language, the validator states that the ordo adonata e-Encyclopedia product being developed is feasible.

The development of the language aspect was carried out by 2 validators who have competence in scientific language (Biology). Validation was carried out on aspects of material coverage with 6 items, up-to-date material with 2 items, and e-Encyclopedia Presentation with 5 items. The average value of the assessment results of the two validators is as in Table 3.

**Table 3.** Validation Assessment Through Material Aspects

| No. | Aspects (Material) of Assessment | Validator | | Average value |
|---|---|---|---|---|
| | | 1 | 2 | |
| 1 | Material Coverage | 3,83 | 4,17 | 4,00 |
| 2 | Update of Material | 4,50 | 4,50 | 4,50 |
| 3 | Presentation of e-Encyclopedia | 4,40 | 4,20 | 4,30 |
| | Total Average Value | 4,24 | 4,29 | 4,27 |

Based on Table 3, it can be seen that the three aspects developed obtained good criteria. Furthermore, from the total average, an assessment achievement of 4.27 was also obtained which

was in the good category. Thus, the product assessment achievement in terms of the material aspect is that it meets the effective criteria. The comments from language expert validators are that the product developed has presented images accompanied by explanatory sentences that are easy to understand. Furthermore, comments were found regarding the weaknesses of the product, namely that there were some incomplete discussions of material, and there were writings about species that were not appropriate. This comment is used as a reference to improve the research product being developed so that the assessment of material aspects shows a proper assessment. Materially, the validator stated that the e-Encyclopedia product of the order adonata being developed was feasible.

The development of the language aspect was carried out by 2 validators who have competence in scientific language (Biology). Validation was carried out on the material aspects of the e-Encyclopedia with 1 item, the size of the e-Encyclopedia with 2 items, and the e-Encyclopedia cover design with 4 items. Design the contents of the e-Encyclopedia with 9 items. The average value of the assessment results of the two validators is as in Table 4.

**Table 4.** Validation Assessment Through Media Aspects

| No | Aspects (Media) of Assessment | Validator | | Average value |
|---|---|---|---|---|
| | | 1 | 2 | |
| 1 | Book Material | 4,00 | 4,00 | 4,00 |
| 2 | The size of the e-Encyclopedia book | 5,00 | 4,00 | 4,50 |
| 3 | E-Encyclopedia cover design | 4,25 | 4,25 | 4,25 |
| 4 | E-Encyclopedia Content Design | 4,56 | 4,33 | 4,44 |
| | Total Average Value | 4,45 | 4,15 | 4,30 |

Based on Table 4, it can be seen that the four aspects developed obtained good criteria. Furthermore, from the total average, an assessment achievement of 4.30 was also obtained which was in the good category. Thus, the product assessment achievement in terms of the media aspect is that it meets the effective criteria. The comments from media expert validators were that the product developed had presented images and presented material in language that was easy to understand and by the material studied by junior high school students. Furthermore, comments were found regarding the weakness of the product, namely that no other images were found that were similar to the adonata order. The comments given by media experts are that other insect models related to the order adonata should be presented. These comments are used as consideration to improve the research product being developed so that the assessment of material aspects shows a proper assessment. In the media, the validator stated that the e-Encyclopedia product of the order of adonata being developed was feasible.

## DISCUSSION

Based on six validators' assessments of the e-Encyclopedia product being developed, a product has been obtained that is suitable for use as teaching material for junior high school students on ordo adonata material. The six validators involved in the validation process are competent experts in their respective fields. The six people consisted of practitioners and teachers who were relevant to their activities. The review/assessment of the encyclopedia is carried out from 3 aspects which include language, material, and media. Viewed from a language perspective, it involves 4 aspects, namely: 1) Straightforwardness as measured by indicators of suitability of sentences with book language rules, suitability of sentences with punctuation, and ease of sentences; 2) Interactiveness as measured by indicators of suitability and effectiveness of e-Encyclopedia e-Encyclopedia material, the accuracy of terms and material in the field of biology; 3) Language rules as measured by indicators of conformity to standard language rules, attractiveness of letters, regular

placement of letters; 4) Language accuracy as measured by indicators of language relevance, ease of language, use of terms. The validator's assessment of the language aspect obtained a total average of 4.35. Thus the e-Encyclopedia design is in the good category.

The results of this research are in line with the findings of (Sabri et al., 2023) in developing teaching materials in terms of the validity of the language aspect with the indicator aspects of grammatical correctness, appropriateness of sentences, encouraging learning, simplicity of sentence structure, questions that do not contain double meanings and clarity of instructions obtained. assessment of language aspects according to valid criteria with high interpretation. Furthermore, the development of the Android-based Kingdom Plantae Mini Encyclopedia for Class

Reviewing the material aspect involves 3 aspects that are assessed. The three aspects are 1) Material Coverage which is measured through the indicators Completeness of e-Encyclopedia Material, Breadth of E-Encyclopedia Material, Depth of e-Encyclopedia Material, Suitability and Effectiveness of E-Encyclopedia Material, Suitability of terms and material in the field of biology, Classification Accuracy; 2) Latest Material as measured by the Faqualization indicator of Material Benefits of e-Encyclopedia for Readers; 3) Presentation of the e-Encyclopedia as measured by indicators of element placement, consistent layout based on patterns, image quality, image placement, use of images, presentation of image captions. Through the assessment of 2 validators on the material aspect, a total average score of 4.27 was obtained. This acquisition value is in the good category.

The results of this research are in line with the findings of Sabri et al., (2023) in developing teaching materials in terms of the validity of the content or material contained in the teaching material products being developed which are in the valid category with high interpretation. The results of research by Azizah et al., (2021) show that the e-encyclopedia developed obtained an average material expert validation score of 85.41%, which means that the product developed is suitable for use as a supplement to teaching materials in class X MIPA 3. Research Solihah et al., (2022) regarding the preparation of an encyclopedia based on the diversity of dragonflies (Odonata) in the Teleng Ngawi Waterfall area as a learning resource for Class has met the eligibility criteria. The development of the Android-based Kingdom Plantae Mini Encyclopedia for Class

Next, 2 validators assessed the media aspects, assessing 4 media aspects consisting of 1) Book Material as measured by the e-encyclopedia Book Print Quality indicator; 2) The size of the e-encyclopedia book as measured by the indicator of the suitability of the size contained in the media, suitability of the size to the material contained in the media; 3) e-Encyclopedia cover design as measured by indicators, cover image, composition, and size of layout elements, title color, use of font; 4) e-Encyclopedia Content Design as measured by indicators: Consistent placement of layout elements based on patterns, clear separation between paragraphs, title and page numbers, image quality, image placement, use of variations in letters (bold, italic, underline, small, etc.), Width of Text Arrangement, Use of Color Composition in Content Material, Overall Media Appearance. From the assessment obtained from the validator, a score of 4.30 was obtained, which gives the interpretation that the research product in terms of the media aspect is in a good category.

The results of research by Azizah et al., (2021) show that the e-encyclopedia development that was developed obtained an average media expert validation score of 84.57%, which means that the teaching material product developed in terms of the media aspect is worthy of being used as teaching material for teaching high school students. Research by Solihah et al., (2022) on the preparation of an encyclopedia based on the diversity of dragonflies (Odonata) as a learning resource for biology subjects in Class meets the criteria of being very feasible. Subsequent research by Marinda et al., (2023) in the development of encyclopedia learning media for science subjects showed that the feasibility of the learning media with an average score of 0.87 was in the high

category, which means that the product being developed is valid. The results of the validity of the E-Encyclopedia of the Order of Odonata from Sumatra through the three aspects developed can be seen in Figure 2.


**Figure 2.** Graphic of Validation Results Assessment Achievement

By paying attention to the three assessment aspects which include language, material and media, these three aspects are in the good category which means that the design of the E-Encyclopedia of the Order of Odonata from Sumatra as Teaching Material for Junior High School Students is good and suitable for use for teaching biology in the material. order of adonata junior high school students.

The results of this research are in line with several previous studies in the development of E-Encyclopedias, namely research conducted by (Cahyanti & Ibrahim, 2018) which revealed that the insect encyclopedia as a learning resource for high school class X is suitable for use in teaching biology lessons to high school students. Likewise, with research conducted by (As'ad et al., 2020) through the development of an insect encyclopedia on organic and inorganic cocoa (theobroma cacao) plantations in Cermo village, Kare subdistrict, Madiun district, an encyclopedia product was obtained that is suitable for use as teaching material for students. Research conducted by (Dawam, 2021) revealed that through the development of an encyclopedia of dragonfly diversity in the Muria mountain area as a biology learning resource for class media experts at 70%; biology teachers at 84%; and the student response was 87.6%, which means that the dragonfly diversity encyclopedia developed has qualities that are suitable for use as a biology learning resource. Furthermore, research conducted by Solihah et al., (2022) through the preparation of an encyclopedia based on the diversity of dragonflies (odonata) in the Teleng Ngawi waterfall area as a class x learning resource, obtained a design for a dragonfly encyclopedia based on its diversity. Furthermore, the results of data analysis Ismail et al., (2022) from media validity tests on e-encyclopedias assessed by expert validators can be seen in Table 3. The total average (validity value) of media validity is all in the range $4 \leq Va < 5$ , that is, it is included in the valid category, the movement system E-encyclopedia media as a learning resource for class XI that was developed is good/valid.

## CONCLUSION

The conclusions from this research are: 1) The resulting e-Encyclopedia product is a good teaching material for the Order of Adonata that is suitable for use as teaching material for junior high school students; 2) This e-Encyclopedia product provides material on Morphology, Behavior,

Life Cycle, Habitat, Benefits, Classification of the order adonata which has passed the Design Research stage; 3) This e-Encyclopedia product also makes it easier for junior high school students and the general public to learn about the adonata order. Furthermore, based on the conclusions that have been described, the following can be recommended: 1) Students can use e-Encyclopedia as an alternative teaching material in studying the order adonata; 2) To parents or teachers in junior high schools to direct students to open applications that are useful and appropriate to the students' learning material; 3) This e-Encyclopedia can be easily distributed by utilizing the internet via online media. As an implication of this research, in the future it is hoped that teachers, students and the general public will be able to use e-encyclopedias in learning activities, especially in biology lessons regarding the odonata order, and other researchers will need to carry out broader studies on other animal orders and conduct field trials to test the practicality and effectiveness of the designs that have been discovered.

## REFERENCES


Ahmad, M., Rohani, Siregar, A. U., & Sabri. (2022). *Pendidikan matematika realistik untuk membelajarkan kreativitas dan komunikasi matematika*. Pekalongan: NEM.

Ahmad, M., Siregar, Y. P., & Siregar, N. A. (2018). Validitas model pembelajaran matematika realistik berbasis budaya mandailing dalam membelajarkan kemampuan koneksi matematis siswa. *Jurnal Education and Development Institut Pendidikan Tapanuli Selatan*, *6*(2), 1–8. Retrieved from https://journal.ipts.ac.id/index.php/ED/article/view/695

Ahmad, M., Siregar, Y. P., Siregar, N. A., & Effendi, H. (2018). Realistic math-based learning model based on mandailing culture. *IJSBAR*, *39*(1), 67–78. Retrieved from https://www.gssrr.org/index.php/JournalOfBasicAndApplied/article/view/8501

Anggraini, Syafi'i, W., & L.N, F. (2022). Pengembangan ensiklopedia mini kingdom plantae berbasis android untuk pembelajaran biologi SMA kelas X. *Jurnal Biogenesis*, *18*(2), 122–131. Retrieved from https://pdfs.semanticscholar.org/3003/f4804e2d16ce6267b2f729e08f34b9b08530.pdf

Arifah, D., Santoso, H., & Noor, R. (2017). Indeks keanekaragaman echinodermata di pantai tanjung setia kabupaten pesisir barat sebagai sumber belajar biologi SMA kelas X. *BIOEDUKASI (Jurnal Pendidikan Biologi)*, *8*(2), 117–124. Retrieved from https://doi.org/10.24127/bioedukasi.v8i2.1068

As'ad, M. C., Yuhanna, W. L., & Dewi, N. K. (2020). Pengembangan ensiklopedia serangga pada perkebunan kakao (theobroma cacao) organik dan anorganik di desa cermo, kecamatan kare, kabupaten madiun. *Prosiding Seminar Nasional SIMBIOSIS*, *5*, 1–24. Retrieved from http://prosiding.unipma.ac.id/index.php/simbiosis/article/view/1766

Azizah, Y. N., Lathifah, S. S., & Hidayat, N. (2021). Pengambangan e-ensiklopedia keanekaragaman talas di kabupaten bogor berbasis ESD untuk meningkatkan literasi digital siswa. *Pedagogia: Jurnal Ilmiah Pendidikan*, *13*(2), 52–56. Retrieved from https://journal.unpak.ac.id/index.php/pedagogia/article/viewFile/4247/2755

Cahyanti, A. D., & Ibrahim, M. (2018). Pengembangan ensiklopedia serangga sebagai sumber belajar untuk SMA kelas X. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *7*(2), 267-274. Retrieved from http://prosiding.unipma.ac.id/index.php/simbiosis/article/view/1766

Dawam, M. M. (2021). *Ensiklopedia keanekaragaman capung di kawasan pegunungan muria sebagai sumber belajar biologi kelas X MA darul amanah kendal*. Retrieved from https://eprints.walisongo.ac.id/id/eprint/17348/1/Skripsi_1403086071_Moh_Mubarok_Dawam.pdf

Dwita, U. R., Ansori, I., Rahman, A., Jumiarni, D., Ruyani, A., & Abas, A. (2022). Pengembangan LKPD berdasarkan keragaman capung di kawasan danau dendam tak sudah. *Diklabio: Jurnal*

*Pendidikan Dan Pembelajaran Biologi*, *5*(2), 1–6. Retrieved from https://doi.org/10.33369/diklabio.6.1.

Hunaepi, H., Firdaus, L., & Kurnia, N. (2016). Validitas buku ajar ekologi berbasis kearifan lokal untuk mengembangkan sikap ilmiah mahasiswa. *Prisma Sains: Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *4*(2), 94–101. Retrieved from https://doi.org/10.33394/j-ps.v4i2.1152

Ismail, R., Imawan, O. R., Ahmad, M., Inayah, S., Imaningtyas, Rahayuningsih, B., Isnainiyah, G., Partiningsih, L., Toyyib, Puspita, I., Sihombing, E., Azimah, N., Rusiati, L., & Safaah. (2023). *Perkembangan peserta didik sebuah teori dan tinjauan kritis*.

Ismail, Suryani, A. I., Nurfadilla, K., & Hasmunarti. (2022). Pengembangan media e ensiklopedia sistem gerak sebagai sumber belajar untuk kelas XI. *Biogenerasi: Jurnal Pendidikan Biologi*, *7*(1), 50–59. Retrieved from https://www.academia.edu/87869334/Pengembangan_Media_E_Ensiklopedia_Sistem_Gerak_Sebagai_Sumber_Belajar_Untuk_Kelas_XI

Kemendikbud. (2017). *PISA programme for international student assessment*. Retrieved from https://puspendik.kemdikbud.go.id/seminar/index.php?folder=Sosialisasi

Marantika, K., Puspaningrum, A. S., & Surahman, A. (2023). Ensiklopedia masakan jawa sebagai pelestarian budaya menggunakan CMS wordpress. *Jurnal Media Jawadwipa*, *1*(2), 1–7. Retrieved from https://doi.org/10.58602/mediajawadwipa.v1i1.16

Marinda, A. D., Erwandi, R., & Mandasari, N. (2023). Pengembangan media pembelajaran ensiklopedia pada mata pelajaran IPA kelas 5 SDN 58 kota lubuklinggau. *JOEAI (Journal of Education and Instruction)*, *6*(2), 478–488. Retrieved from https://doi.org/10.31539/joeai.v6i2.5934

Nurhatmi, J., Rusdi, M., & Kamid. (2015). Pengembangan ensiklopedia digital teknologi listrik berbasis contextual teaching and learning (CTL). *Edu-Sains: Jurnal Pendidikan Ilmu Pengetahuan Alam*, *4*(1), 37–42. Retrieved from https://online-journal.unja.ac.id/edusains/article/view/2367/7805

Pardosi, S. M., Situmorang, M. V., & Silaban, W. (2023). Pengembangan media pembelajaran biologi ensiklopedia berbasis problem based learning terhadap hasil belajar pada materi keanekaragaman hayati kelas X di SMA negeri 6 pematangsiantar. *Indonesian Journal of Mathematics, Science Dan Education Mathematics, Science*, *1*(3), 149–160. Retrieved from https://doi.org/10.37312/imatype.v2i2.7458

Permatasari, E. A., Mudakir, I., & Fikri, K. (2017). Pengembangan e-modul berbasis adobe flash pada pokok bahasan sistem reproduksi untuk kelas IX MIPA SMA. *Saintifika*, *9*(1), 57–65. https://jurnal.unej.ac.id/index.php/STF/article/view/9733

Plomp, T. jeerd. (2010). Educational design research: an introduction. In *An Introduction to Educational Design Research* (pp. 9–35).

Prameswari, I. T., & Sulistyowati, T. I. (2016). Inventarisasi capung (odonata) di kawasan wisata air terjun irenggolo kediri jawa timur. *Prosiding Semnas Hayati IV Universitas Nusantara PGRI Kediri*, 73–77. Retrieved from http://conference.unpkediri.ac.id/files/conferences/6/hayati/hayati4/artikel/B7.pdf

Prihartanta, W. (2015). Ensiklopedia umum (Nasional). *Jurnal Adabiya*, *5*(85), 1–14. Retrieved from https://www.academia.edu/19792281/Ensiklopedia_Umum_Nasional_

Purbosari, P. M. (2016). Pembelajaran berbasis proyek membuat ensiklopedia Ilmu Pengetahuan Alam (IPA) untuk meningkatkan academic skill pada mahasiswa. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, *6*(3), 231–238. Retrieved from https://doi.org/10.24246/j.scholaria.2016.v6.i3.p231-238

Rahmawati, M. D., Wahyuningtyas, L., & Eginuranda, L. A. (2023). Inventarisasi Odonata Di

Kawasan Air Terjun Roro Kuning. *In Prosiding Seminar Nasional Hasil Penelitian Dan Abdimas*, 259–268. Retrieved from http://conference.unpkediri.ac.id/files/conferences/6/hayati/hayati4/artikel/B7.pdf

Risti, A. K., Utami, S., & Pujiati, P. (2017). Penyusunan bahan ajar bioteknologi berbasis penelitian pengaruh merkuri terhadap pertumbuhan azotobacter diisolasi dari rizozfer leguminoceae. *Prosiding Seminar Nasional SIMBIOSIS*, 389–394. Retrieved from http://prosiding.unipma.ac.id/index.php/simbiosis/article/view/355

Rosyida, F., Utaya, S., & Budijanto. (2016). Pengaruh kebiasaan belajar dan self-efficacy terhadap hasil belajar geografi di SMA. *JURNAL PENDIDIKAN GEOGRAFI: Kajian, Teori, dan Praktek dalam Bidang Pendidikan dan Ilmu Geografi*, *21*(2), 17–28. Retrieved from https://journal2.um.ac.id/index.php/jpg/article/view/304

Sabri, Kholil, U., & Ahmad, M. (2023). Validitas buku ajar dengan pendekatan kontekstual dalam membelajarkan kemampuan berpikir kreatif siswa sekolah dasar. *Jurnal Elementaria Edukasia*, *6*(3), 1043–1056. Retrieved from https://doi.org/10.31949/jee.v6i3.6629

Safitri, A., & Dewi, N. R. (2021). Kajian teori : Pengembangan bahan ajar berbasis kontekstual materi aritmetika sosial untuk meningkatkan kemampuan berpikir kritis matematis pada pembelajaran preprospec berbantuan TIK. *PRISMA, Prosiding Seminar Nasional Matematika*, *4*, 59–66. Retrieved from http://lib.unnes.ac.id/53051/

Siregar, L. H., Rambe, Y. M., & Lubis, U. K. (2020). Ensiklopedia budaya TAPPATAMA (tapanuli selatan, padang lawas, tapanuli utara dan mandaling) berbasis android untuk menumbuh kembangkan cinta budaya bangsa siswa sekolah dasar. *Jurnal Education and Development*, *8*(3), 944–944. Retrieved from https://journal.ipts.ac.id/index.php/ED/article/view/2110

Solihah, E. E., Utami, S., & Dewi, N. K. (2022). Penyusunan ensiklopedia berbasis keanekaragaman capung (odonata) di kawasan air terjun teleng ngawi sebagai sumber belajar kelas X. *JEMS: Jurnal Edukasi Matematika Dan Sains*, *10*(2), 424-430. Retrieved from http://e-journal.unipma.ac.id/index.php/JEMS/article/view/13373

Sugiyono. (2016). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.