



Development of atlas Kingdom Plantae morphology of mangrove plant based on local potential at PPLH Puntondo Takalar

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Abstract: Development of atlases needs to be developed through teaching material based on local potential. This study aims to (1) Determine the steps for developing teaching materials atlas kingdom plantae morphology of mangrove plants based on local potential at PPLH Puntondo Takalar; and (2) Test the level of validity, practicality, and effectiveness of teaching materials atlas kingdom plantae morphology of mangrove plants based on potential at PPLH Puntondo Takalar. The ADDIE research model (Analysis, Design, Development, Implementation, and Evaluation). The development model is used in this type of research and development. Validity, practicality, and effectiveness are evaluated during the product development process. Twenty six (26) students of class XI IPA MA Muhammadiyah Salaka were used as research objects. Product validity is assessed using media validation sheets, practicality the product is assessed using responses from students and educators, and the effectiveness of the product is assessed. The level of data validity is 3.6, meaning it is very valid. The practicality level of the answer is 92%, which means it is very practical. the results of the research, the Magic Box teaching materials should be used because they meet the valid, useful, and effective requirements.

Keywords: atlas, development, local potential, PPLH Puntondo

Abstrak: Pengembangan atlas perlu dikembangkan melalui bahan ajar berbasis potensi lokal. Penelitian ini bertujuan untuk (1) Mengetahui langkah-langkah pengembangan bahan ajar atlas Kingdom Plantae morfologi tumbuhan mangrove berbasis potensi lokal di PPLH Puntondo Takalar; dan (2) Menguji tingkat kevalidan, kepraktisan, dan keefektifan bahan ajar atlas Kingdom Plantae morfologi tumbuhan mangrove berbasis potensi lokal di PPLH Puntondo Takalar. Model Penelitian ADDIE (Analysis, Design, Development, Implementation, and Evaluation). Model pengembangan digunakan dalam jenis penelitian dan pengembangan ini. Validitas, kepraktisan, dan efektivitas dievaluasi selama proses pengembangan produk. Duapuluh enam (26) Siswa kelas XI IPA MA Muhammadiyah Salaka dijadikan sebagai objek penelitian. Validitas produk dinilai menggunakan lembar validasi media, kepraktisan produk dinilai menggunakan tanggapan dari siswa dan pendidik, dan keefektifan produk juga dinilai. Tingkat validitas data 3,6 artinya sangat valid, tingkat kepraktisan jawaban 92% artinya sangat praktis Siswa yang mengikuti tes hasil belajar bahan ajar atlas mendapat skor 86,3 artinya sangat efektif. Berdasarkan hasil penelitian, bahan ajar Kotak Ajaib sebaiknya digunakan karena memenuhi syarat valid, bermanfaat, dan efektif.

Kata Kunci: atlas, development, local potential, PPLH Puntondo

Introduction

Indonesia is known as a megadiversity country which has diversity and abundant natural resources (Sartika & Achmad, 2015). Indonesia's biodiversity is scattered in every region. This biodiversity is none other than a part of the sign of the power of Allah swt. in this universe, in which Allah swt., the Creator and the Supreme Regulator of the Environment, orders humans to see these signs of the universe. Therefore, there are many verses in the Qur'an that call on humans to research and investigate the heavens and the earth as well as all natural phenomena and everything that can be seen in the environment (Muttaqin, 2020). As explained in the book *Tafsir Al-Wasith*, that by His power and arrangement, Allah SWT sends down water from the clouds with a condition, which with rain water Allah grows various types of green trees and types of plants with various shapes, special features, and relic type. Truly in that there are signs of greatness for the believers. Therefore utilizing, exploring and developing biodiversity as one proof of faith in Allah swt. (Az-Zuhaili, 2012). As explained in the word of God in QS Al-An'am: 99.

وَهُوَ الَّذِي أَنْزَلَ مِنَ السَّمَاءِ مَاءً فَأَخْرَجْنَا بِهِ نَبَاتَ كُلِّ شَيْءٍ فَأَخْرَجْنَا مِنْهُ خَضِرًا نُخْرِجُ مِنْهُ حَبًّا مُتَرَاكِبًا
 وَمِنَ النَّخْلِ مِنْ طَلْعِهَا قِنْوَانٌ دَانِيَةٌ وَجَذْتٌ مِّنْ أَعْنَابٍ وَالزَّيْتُونَ وَالرُّمَّانَ مُشْتَبِهًا وَغَيْرَ مُتَشَابِهٍ انظُرُوا
 إِلَى ثَمَرِهِ إِذَا أَثْمَرَ وَيَنْعِهِ إِنَّ فِي ذَلِكُمْ لَآيَاتٍ لِّقَوْمٍ يُؤْمِنُونَ ﴿٩١﴾

Meaning:

“And it is He who sends down water from the sky, then we grow the water with all kinds of plants, so we remove the green plants from the plants, we remove the green plants from the grains that many; and from the mounds of dates, spreading stalks that dangle, and vineyards, and (We also bring out) olives and pomegranates that are like and not like. Watch the fruit when it bears fruit, and when it ripens. Indeed, in that there are signs (of Allah's power) for those who believe.”

Therefore, knowledge about regional potential is very important to be taught to students so that this is regulated in the National Education System Law No. 20 of 2003 Chapter X Article 36 paragraph 2 which explains that the curriculum for all levels and types of education is developed based on the principle of diversification according to educational units, regional potential, and students. Then continued in paragraph 3 in point c it is also explained that the curriculum is arranged according to educational levels while taking into account the diversity of regional and environmental potentials (Ministry of National Education, 2003).

Biology subjects are part of science in education which has great opportunities and potential in making the environment a source of learning and can be used as content of learning materials. Assessing local potential is one of the uses of the environment as a source of learning both in the school environment or in educational tourism spots in each region (Situmorang, 2016). The local potential referred to in this study is the potential resources or strengths of an area that have not been realized for the benefit of learning (Kusuma, 2018).

Based on the results of observations made at Madrasah Aliyah Muhammadiyah Salaka class X IPA that the learning process that has been carried out so far uses biology textbooks published by the government but has not optimally utilized local potential as material content in the learning process. Even though educators realize that the existence of local potential is very important for students to learn, due to the limited availability of teaching materials for enrichment programs that accommodate regional potential, ultimately the use of local potential is not optimized in the learning process. This is supported by statements from students who stated that while studying biology they had never used special local potential-based teaching materials that supported learning activities both inside and outside the classroom.

Based on the description of the problem above, it indicates that there is a need for support for the learning process at Madrasah Aliyah Muhammadiyah Salaka by developing contextual teaching materials based on local potential. Contextual teaching materials that could be an option to develop are atlases based on local potential. The atlas developed in this study is one of the teaching materials which is equipped with color pictures, explanations and contains a mapping of the species found. Atlases can be used by students as a source of support for practicum activities as well as confirmation teaching materials in carrying out the problem-solving analysis process (Raddina et al., 2021).

Research related to the development of atlases has been widely researched by researchers including, Hasanah (2017), with a study entitled atlas of plant morphology based on local potential in the Bantimurung national park which shows that the development of atlases as teaching materials is very feasible to use. Furthermore, the development of an atlas of biodiversity carried out by Kusuma et al (2018), based on the results of the validation of the atlas developed is feasible to use.

Based on the description above, the researcher wants to develop a teaching material based on local potential, namely mangrove plants which embodied in the form of an atlas book. The researcher hopes that this Atlas can become a supporting teaching material to enrich the mastery of knowledge and can provide contextual data so that students are able to identify the field.

Materials and Methods

The type of research used is research and development. Development research is a type of research that aims to produce a product, concept, method, program that can simplify the problems encountered in learning media. The location of the research is that this research will be carried out at Madrasah Aliyah Muhammadiyah Salaka, Takalar district with the research subject being students of class X IPA with a total of 26 students.

The development model applied in this study refers to the ADDIE development model. The ADDIE development model consists of 5 steps, namely analysis, design, develop, implementation and evaluate (Brench, 2009). This validation sheet aims to assess several things from the product to be produced, namely assessing aspects of presentation, content, language used, and good readability. The questionnaire contains a number of questions regarding the teaching materials that have been developed which are then given to educators and students after the resulting teaching materials have been used in learning. As a result of the information from the respondents, the researcher can measure the level of practicality of the teaching materials produced in this study. The results of this study test then become a benchmark for the effectiveness of atlas biology teaching materials.

Validity, practicality, and effectiveness tests were used to implement the data collection strategy. The validator assesses the validity test. Table 1 shows the validity category.

$$\overline{K_i} = \frac{\sum_j^n =1V_{ij}}{n}$$

Information:

M = $\overline{K_i}$ Validity of each criterion

M = $\overline{A_i}$ Validity of each aspect

M = \overline{X} Validity of all aspects

Table 1. Validity criteria

Score	Criteria
$3.5 < M \leq 4$	Very Valid
$2.5 < M \leq 3.5$	Valid
$1.5 < M \leq 2.5$	Valid Enough
$M \leq 1.5$	Invalid

The media practicality test can be measured based on the results of the questionnaire responses of educators and students.

$$P = \frac{\text{Skor Jawaban Responden}}{\text{Total Skor}} \times 100$$

Table 2. Practicality level criteria

Percentage	Criteria
81% - 100%	Very practical
61% - 80%	Practical
41% - 60%	Practical enough
21% - 40%	Less practical
0 - 20%	Very impractical

The average value is 41% - 60% as a reference for deciding that the teaching materials that the researcher has developed are accepted by having a sufficient degree of practicality, namely being in the criteria of being quite practical.

$$N = \frac{W}{n} \times 100\%$$

Information:

N = Value obtained by students

W = Number of questions correct

N = Number of items

Table 3. Criteria for the level of effectiveness

Completeness Percentage	Calcification
>80	Very effective
>60 - 80	Effective
>40 - 60	Effective enough
>20 - 40	Less effective
≤20	Very less Effective

1. Level of validity of teaching materials atlas

The validity level of the ADDIE development model is at the development stage because at this stage there are expert validation activities. Based on suggestions for improvement that have been given by two validators, prototype 1 is repaired with reference to suggestions for improvement and produces prototype II. Changes from prototype 1 to prototype II. the deficiencies found in prototype I are in accordance with the suggestions of the validator, then the resulting prototype II is assessed by the validator in Table 4.

Table 4. Results of the validator's assessment of the teaching materials developed

Assessment Aspects	Rating Result	Category
Content eligibility	3.8	Very Valid
Presentation	3.7	Very Valid
Language	3.5	Valid
Graphics	3.5	Valid
Average	3.6	Very Valid

Based on Table 4, it shows that there are four aspects in the assessment of the development of teaching materials. The first aspect, namely content feasibility, has an average value of 3.8. This value indicates a very high atlas qualification, so the atlas is very feasible/ valid to use. The second aspect, namely presentation, has an average value of 3.7. The acquisition indicates a very high qualification, which means that the atlas is very worthy of use. The third aspect is language, which has an average score of 3.5. The fourth aspect of graphics that gets an average value of 3.5 with a valid category. The overall assessment shows an average value of 3.6 with a very valid category so that from the point of view of developing teaching materials, the atlas is very feasible to use.

2. Level of practicality of teaching materials atlas

The atlas that was developed was tested for the practicality of the atlas by measuring it using research instruments in the form of student response questionnaires and educator responses.

Table 5. Results and practicality analysis

No	Rating Type	Average
1	Student response	89%
2	Educator response	95%
Total Average		92%
Assessment criteria		Very Practical

Based on Table 5, the results of the analysis of student response questionnaires and educator response questionnaires to the atlas teaching materials that have been developed, the average response from all aspects is 87.5%, which means it is included in the very practical category. Based on the practicality criteria category, if the practicality value is at a value of 80% - 100%, it is categorized as very practical.

3. Level of effectiveness of teaching materials atlas

The effectiveness of atlas teaching materials obtained by analyzing the results of student learning tests in the form of multiple choice questions totaling 25 items. The subjects of this study as a whole amounted to 26 students, seen in Table 6.

Table 6. Percentage of mastery of student learning outcomes

No.	Score	Category	Frequency	Percentage (%)
1	0-69	Not completed	0	0%
2	70-100	Complete	26	100%
Amount				100%

Students are declared complete if they get a score equal to or greater than the KKM score (Score \leq KKM), the KKM score is 70. Learning is said to be successful and effective if at least 80% of students achieve a complete score. Based on Table 6 it can be concluded that there were 26 students who achieved the KKM score with a percentage of 100%, which means that the complete category is already above the minimum score of completeness of learning outcomes. Based on the data above, it can be concluded that the atlas developed is categorized as effective.

Results and Discussion

Using the ADDIE model, this study aims to develop teaching materials atlas of Kingdom Plantae morphology of mangrove plants based on local potential at PPLH Puntondo Takalar that meet valid, practical, and effective criteria on Angiospermae material in class XI MA Muhammadiyah Salaka. There are five stages in the ADDIE learning model: Analyze, Design, Development, Implementation and Evaluation. The following are the results of the development stages that have been completed.

A. Stages of Analysis

The first stage is the analysis stage. At this stage identification of problems with the process of implementing learning is carried out at MA Muhammadiyah Salaka, Takalar. The basic problem found is the use of local potential that has not been optimized by educators because educators do not have teaching materials that specifically discuss local potential. Meanwhile, integrating lessons with local potential is one of the important things in curriculum development, as stated in the National Education System Law No. 20 of 2003 Chapter X Article 36 paragraph 2 which explains that the curriculum for all levels and types of education is developed based on the principle of diversification according to educational units, regional potential, and students. Then continued in paragraph 3 in point C it is also explained that the curriculum is arranged according to educational levels while taking into account the diversity of regional and environmental potentials. This shows that in the development of the education curriculum, the National Education System really supports regional potential as something that must also be prioritized by the Ministry of National Education (2003), then from the results of the needs analysis, students also need other learning resources to support their learning activities. Students express that they enjoy learning biology when it is associated with the natural surroundings such as local plants in their own area.

B. Design Stages

The second stage is the design stage, which consists of several stages regarding the design of teaching materials to be developed. First, compiling a list of components needed in product development the components needed in product development consist of content components in the form of mangrove plant data which was carried out at PPLH Puntondo, Takalar. The results of the mangrove plant identification data obtained were then made into an initial arrangement of teaching materials to be developed. This aims to produce products in the form of teaching materials that are valid, practical, and effective. Therefore, at this stage, a product validation instrument was prepared. At this stage the

researcher also designed lesson plans, learning achievement tests, educator response questionnaires, student response questionnaires, and validation sheets for the atlas teaching materials to be developed.

C. Development Stages

The activities carried out by researchers at this stage are developing products that have previously been designed. The product in the form of prototype I was then validated by experts with the aim of assessing the developed Atlas. Suggestions and input from 3 validators were then used as the basis for revising the product. After revising the media according to the suggestions, a valid prototype II was obtained to be tested. The results of prototype I and prototype II that had been made can be seen in Table 7.

Table 7. Revision results on the advice of validator I and validator II

Before Revision	Comparison Results	After Revision



D. Implementation Stages

The implementation stage was carried out specifically for class X IPA MA Muhammadiyah Salaka, Takalar. However, during the implementation process, the MA Muhammadiyah Salaka school, Takalar implemented the Merdeka Curriculum for class X IPA which in biology subjects in this curriculum did not contain Kingdom Plantae material, this is evidenced by the Merdeka Curriculum biology book used by educators. Therefore, on the advice of supervisors and educators as expert practitioners, they suggest choosing class XI as a research subject on the basis that class XI has passed the Kingdom Plantae material. So finally the researcher implemented the atlas in class XI to test the practicality and effectiveness of the atlas teaching materials based on local potential.

E. Evaluation Stage

This evaluation is of course carried out to improve the teaching materials that the researcher has developed if in implementing the teaching materials in real conditions it turns out that there are still weaknesses and deficiencies, then revisions are made and based on criticism and suggestions from validator experts. The purpose of implementing this evaluation is to determine the efficiency and effectiveness of the product in the learning process. Evaluation is carried out by giving tests to students to test the effectiveness of the atlas teaching materials being developed. The instrument used is test items in the form of multiple choice totaling 25 numbers.

Conclusion

Based on the results of the research and discussion, it can be concluded that teaching materials atlas Kingdom Plantae morphology of mangrove plants based on local potential at PPLH Puntondo Takalar it was developed using the ADDIE development model which consists of 5 stages, namely: Analysis, Design, Develop, Implementation, and Evaluate. The atlas teaching material was developed to meet the very valid category with an average score obtained of 3.6, to fulfill the very practical category with the acquisition of an average score obtained to be 92%, to fulfill the effective category because the percentage of classical learning completeness obtained was 100% with an average student score of 86.3.

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