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Development of the popular scientific book of Nepenthes diversity in Tanta District forest areas, Tabalong Regency: Validity and Practicality

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Abstract

Developing teaching materials based on local potential is necessary for introducing objects in the surrounding environment to support student learning. This is expected to broaden the insights and knowledge of students so that they become more familiar with and know the object of the material being taught. Wetlands are the dominant area in the South Kalimantan region and can be one of the learning resources in producing a product that can support learning at all levels of education; this can be in the form of local potential-based teaching materials, one of which is a popular scientific book. This study aims to describe the validity and practicality of popular scientific books based on the results of research on the Diversity of Semar Pockets (Nepenthes) Forest Areas in Tanta District, Tabalong Regency ". The validity and practicality tests were carried out at the Preliminary field testing stage used in the Borg and Gall model development research at the validity test stage involving two validators, while the practicality test involved 30 students who had passed the Phanerogamae course. The results showed that the Popular Scientific Book "Diversity of Semar Bag Species (Nepenthes) in the Forest Area of Tanta District, Tabalong Regency," obtained a very valid and very practical category. The results of this study indicate that the popular scientific book prepared can be used further to test its effectiveness on the learning process and outcomes.

Abstrak. Pengembangan bahan ajar yang berbasis potensi lokal sangat perlu dalam memperkenalkan objek yang ada di lingkungan sekitar dalam menunjang pembelajaran peserta didik. Hal ini diharapkan memperluas wawasan dan pengetahuan peserta didik lebih mengenal dan mengetahui akan objek materi yang dibelajarkan. Lahan basah merupakan kawasan yang dominan di wilayah Kalimantan Selatan, dapat menjadi salah satu sumber belajar dalam menghasilkan suatu produk yang dapat mendukung pembelajaran di semua tingkat pendidikan, hal ini dapat berupa bahan ajar berbasis potensi lokal salah satunya yaitu buku ilmiah populer. Penelitian ini bertujuan untuk mendeskripsikan kevalidan dan kepraktisan buku ilmiah populer berbasis hasil penelitian Keragaman Kantong Semar (Nepenthes) Kawasan Hutan di Kecamatan Tanta Kabupaten Tabalong". Uji kevalidan dan kepraktisan dilaksanakan pada tahap Preliminary field testing yang digunakan dalam penelitian pengembangan model Borg and Gall pada tahap uji kevalidan melibatkan dua validator, sedangkan uji kepraktisan melibatkan 30 mahasiswa yang sudah lulus mata kuliah Phanerogamae. Hasil penelitian menunjukkan Buku Ilmiah Populer "Keanekaragaman Jenis Kantong Semar (Nepenthes) di Kawasan Hutan Kecamatan Tanta Kabupaten Tabalong" yang dikembangkan memperoleh kategori sangat valid dan sangat praktis. Hasil penelitian tersebut menunjukkan bahwa buku ilmiah populer yang disusun dapat digunakan lebih lanjut untuk uji efektivitasnya terhadap proses maupun hasil belajar.

A. Introduction

Learning devices have an essential role in the learning process. This is because learning tools can determine the achievement of set educational goals. Educators must be able to develop learning tools that are appropriate to current developments so that it is hoped that the knowledge and insight in learning can adapt to the demands of the goals to be achieved. In this way, they can solve all the problems in the surrounding environment. This is often referred to as contextual learning, where learning focuses on students based on the issues they encounter in their environment. This is supported by (Trianto, 2008), the contextual approach assumes that the mind naturally seeks the meaning of context according to the actual situation of one's environment.

Combining subject matter with students' daily context in contextual learning will produce in-depth knowledge bases where students have a rich understanding of problems and ways to solve them. Contextual learning is expected, one of which is that educators must have skills in developing learning tools, including teaching materials that can utilize local potential as objects of study or supporting media in learning. Hopefully, this will make it easier for students to understand and familiarize themselves with the study material. Introducing objects or materials that are often experienced, known, or in the environment of students will also make it easier to achieve learning objectives.

Environment-based learning model, can also improve students' mastery of biological concepts because environmentally oriented problem-based learning can improve students' learning outcomes and science process skills. In this lesson, students are invited to study the impact of environmental changes on living creatures and how to maintain ecological balance. Apart from that, environment-based learning can also increase student motivation and learning outcomes.

Learning in lectures in the Biology Education Study Program, which is closely related to living things, is very easy to implement because studying the learning material will easily be found in the surrounding environment and students' daily lives, so students can broaden their horizons and knowledge to get to know objects in the world learn. These learning resources from the surrounding environment can become teaching materials expected to help students easily understand the material. This is because students can easily recognize and know the object of study being studied.

It is hoped that the existence of teaching materials based on local potential in lectures, primarily as enrichment or addition to existing material, can support broadening students' horizons and knowledge for the introduction and understanding of the concepts of the material provided. This is also the case in the Phanerogamae

course. The material studied is very closely related to flora (plants) or the diversity of plant types and their use and sustainability. The results of the needs analysis obtained data: 1) There are no teaching materials in the form of popular scientific books on the diversity of pitcher plants in the region in South Kalimantan in the Phanerogamae course, 2) There is a need for teaching materials that are contextual to the surrounding environment so that students. It is hoped that they will be able to connect the material studied in the Phanerogamae course with everyday life. 3) The material in the Phanerogamae course requires teaching materials containing many pictures of plant types as additional references.

The solution to the problems that arise is to add references in the form of teaching materials, Popular Scientific Books, and material on the diversity of pitcher plants in learning. Having interesting additional references and covering all the material content with clear images makes it easier for students to know the types of plants, increasing interest and student motivation regarding the material. Likewise, educators facilitate the process of delivering material. Sixty-four types of pitcher plants have been identified in Indonesia, including 64 pitchers. Most of the identified pitcher plants are found on the island of Borneo (Kalimantan, Sarawak, Sabah, and Brunei).

Research on pitcher plants that were developed into teaching materials was research conducted by Khairunnas (2018), who conducted research in Burni Telong, Really Exciting about the Inventory of Pitcher Plants (*Nepenthes* spp.) on the Burni Telong Volcano Bener Meriah as a reference Higher Plant Botany Course. Research results on three types of pitcher plants (*Nepenthes* spp.) were obtained: *Nepenthes lavicola*, *Nepenthes angasinensis*, and *Nepenthes tobaica*.

Previous research by Mahrudin (2011) entitled "Composition, Structure and Minimum Survival Value of *Nepenthes* Based on Habitat Varieties in Tabalong Regency" obtained six types of pitcher plants, which, according to Mahrudin (2011) explained that *Nepenthes* could grow well in clay soil types include, sandy soil, peat soil, limestone soil, rocky soil, and dry soil. Pitcher plants can also develop on the edges of swamps or lakes, where their habitat is characterized by soil with low nutrient elements, which causes differences in the number of species found in each habitat. Based on this pitcher plant's uniqueness, it can be used as a learning resource, which can then be developed as material in Popular Scientific Books. Research on the development of scientific books has been carried out previously by Lesman et al. (2018), who showed that scientific books are locally based on Bamboo, which is classified as effective for use in learning Botany of Higher Plants.

The results of this research are used as an additional reference in the form of a pocketbook in

the Botany of Higher Plants course. Preliminary research conducted by researchers in the forest area in Tanta sub-district, Tabalong Regency, found 9 types of pitcher plants. These nine types of pitcher plants have the potential to be used as material in the Phanerogamae course. The diversity of pitcher plants obtained in the forest area of Tanta sub-district, Tabalong Regency, was then made into a Popular Scientific Book as enrichment material. This popular scientific book was tested for validity and received a score of 3.78 with very valid criteria.

To find out how practical this popular scientific book is when used by students, this prompted researchers to conduct this research with the title "Practicality of the Popular Scientific Book "Diversity of Semar Pockets (Nepenthes) in Forest Areas in Tanta District, Tabalong Regency". The need for locally based teaching materials as explained above encouraged researchers to develop the Popular Scientific Book "Diversity of Semar Pockets (Nepenthes) in Forest Areas in Tanta District, Tabalong Regency as Enrichment Material for Phanerogamae Courses." The research results will be used as teaching materials in the form of Popular Scientific Books, which can increase insight and knowledge for students, especially in courses that

contain local potential in wetlands whose practicality is first tested.

B. Material and method

The type of research used is Research and Development (R&D). This research uses the Borg and Gall model. The research period is one month, from August to September 2023. The validity test involved two validators, while the practicality test involved 30 students who had taken the Phanerogamae course in Biology Education Study Program of Lambung Mangkurat University. The research object is Popular Scientific Books, developed based on descriptive research data regarding "Diversity of Nepenthes Forest Areas in Tanta District, Tabalong Regency."

Meanwhile, the first was a validity test using a validation questionnaire instrument by two validators. The assessment score is in the form of a Likert scale with a range of 1 to 4. The score given is calculated as a percentage, and the level of validity is determined based on the criteria (Pratiwi et al., 2014) in Table 1. Popular Scientific Books's practicality level is used as a criterion for the practicality of open materials; this can be seen in Table 2. The practicality test was analyzed descriptively using categories based on Akbar (2013) in Table 3.

Table 1 Popular scientific book validity percentage criteria

Percentage Range (%)	Practicality Category
79.78 - 100	Very valid, The product is ready to be used in the field for field activities
59.52 - 79.77	Valid, can be used but needs to be added what is missing, no additions have been made too big and not basic.
39.26 - 59.51	Less valid, it is recommended that it is not used because it is necessary revise by examining again carefully and look for product weaknesses to improve.
19.00 - 39.25	Invalid, cannot be used, make major revisions size and fundamentals about product content

Table 2 Instrument scores criteria

Score	Practicality Category
4	Very Practical
3	Practical
2	Less Practical
1	Very impractical

Table 3 Popular scientific book practicality percentage criteria

Percentage Range (%)	Practicality Category
75.00% - < 100%	Very Practical, can be used without revision
50.00% - < 75.00%	Practical, usable but needs minor revisions
25.00% - < 50.00%	Less Practical, should not be used
01.00% - < 25.00%	Very impractical, should not be used

C. Results and discussion

The research results in the form of Popular Science Books are enrichment teaching materials for Phanerogamae courses, especially those taught in the Biology Education Study Program, as enrichment materials based on local potential, which are expected to add references to this course. The products

developed are shown in Figure 1. According to Putra et al. (2020), validity is tested by experts or experts in an activity, namely expert review, to obtain suggestions, comments, and input, which are then used as a reference in improving teaching materials. According to Harlis & Budiarti (2017), content validity is assessed to assess the suitability of the teaching materials developed with knowledge and concepts.

According to Putri et al. (2021), teaching materials are designed with spelling according to the correct Indonesian spelling, and the language used is attractive and easy to understand. According to Afza (2016), color plays a vital role in the design and presentation of devices. In everyday life, color attracts attention, and a colorful combination will make the

product more attractive. According to Ulandari & Syamsurizal (2021), presentation validity includes systematic presentation, presentation support, learning presentation, and systematic support by relevant illustrations, and the presentation of a product is valid if the primary material is complete. The validity test results can be seen in Table 4.



Figure 1 Front cover and table of content of popular science books (in Indonesian)

Table 4 Validity test results

Assessment Aspect	Total Score (%)
Content Aspect	91,7
Linguistic Aspect	100
Presentation Aspect	94,6
Average Score	95,5
Practicality Criteria	Very Valid

Table 5 Practicality test results

Assessment Aspect	Total Score (%)
Content Aspect	94,16
Linguistic Aspect	91,11
Presentation Aspect	91,94
Graphic Aspect	96,11
Average Score	93,33
Practicality Criteria	Very Practical

Based on the results of the calculation of the first test, namely the validity score test for the validity of the Scientific Book enrichment material Popular "Diversity of Types of Pitchers (Nepenthes) in Forest Areas Tanta Village, Tabalong Regency" above, the validity score for the content aspect is 91.7%, linguistic aspect of 100%, and presentation aspect of 94.6%. The material enrichment developed with a total validation score of 95.5% with criteria Very

Valid, which shows that the Popular Scientific Book is by material criteria in the Phanerogamae Course. According to Putra & Fitrihidajati (2022), validity is tested by experts or internal experts in an activity, namely an expert review, to obtain suggestions, comments, and input.

The results are then used as a reference for improving teaching materials. Sugiyono (2015) validated the products developed by several experts

or experienced experts to assess the designed product so you can know the advantages and disadvantages. Necessary validation tests were carried out to obtain valid values from experts or experts on developed teaching materials. Teaching materials in the form of Popular Scientific Books must also contain the results of product validation assessments to be designed so that teaching materials are made suitable and accurate for use by targets in the learning process, namely students. Expert validation of teaching materials in the form of Popular Scientific Books includes three aspects of assessment: content, linguistics, and presentation.

After carrying out a validity test and obtaining a score with very valid criteria, the popular scientific book is continued for the next practicality test. A practicality test was given to 30 students to find out how practical popular scientific books are when used. The practicality of student responses can be seen in Table 5. This shows that the material enriches the form of Popular Scientific Books in terms of content, linguistic, presentation, and graphic aspects. So, the total average score of the readability test results is 93.33%, which indicates that the enrichment material developed is said to have achieved the practicality criteria of Very Practical. Popular scientific books can be very practical and used as enrichment material. This shows that the enrichment material in the form of Popular Science Books is easy to understand and suitable for use. However, minor revisions need to be made referring to suggestions from students so that Popular Science Books can be even better. Each aspect is explained below.

Practical Aspects of Content

There are three points in the content aspect to assess the product or teaching material created in this aspect. These points are that the images displayed in Popular Science Books make it easier for students to understand the material. Popular Science Books are appropriate to the material, and the material is related to everyday life. According to Kosasih (2021), the curriculum must develop teaching materials, use materials associated with the surrounding environment, and be able to stimulate the students who use them. According to Magdalena et al. (2020); Wahyunah et al. (2022); Hafizha et al. (2022), the learning material in the developed teaching materials must be relevant to achieving competency standards and essential competencies. It must have knowledge aspects such as facts, concepts, and principles.

Practical Aspects of Language

There are three points to assess the product or teaching material created in this aspect. These points are that the language used in Popular Scientific Books is easy to understand, the accuracy of writing scientific names or foreign names, and students feel motivated to study the material on biodiversity after

using Popular Scientific Books. The percentage of readability scores obtained in this aspect is 91.11%.

The linguistic aspects of teaching materials include the language used well and quickly understood, the language style being communicative, and the editorial being clear (Asikin, 2018). Suitable teaching materials must fulfill the grammatical component if written information or messages can be easily communicated to students in writing, are logical and easy to digest, and are accepted according to the student's cognitive stage (Rahmatih et al., 2017). The linguistic aspects of teaching materials must be considered so that they are easily understood by users, such as using language appropriate to the students' conditions, using effective sentences, and avoiding double meanings (Kosasih, 2021).

Practical Aspects of Presentation

There are three indicator points to assess the product or teaching material created in this aspect. The indicator points are that the images displayed in the Popular Science Book are clear, students can learn independently using the Popular Science Book, and the material is presented by systematic writing, including the introduction, body, and conclusion. The percentage of readability scores obtained in this aspect is 91.94%. According to Irwandi & Fajeriadi (2019); Hanifah (2020); Fauzia et al. (2023), teaching materials that students like are interesting reading materials with lots of pictures and little description, increasing their interest in reading because pictures help readers imagine and improve their memory performance. According to Prastowo (2012), good presentation of teaching materials must contain illustrations and photographs that can give students an accurate picture of the material they are studying.

Practical Aspects of Graphics

There are three indicator points to assess the product or teaching material created in this aspect. The indicator points are that the cover design is attractive, the combination of colors and design of the Popular Scientific Book is attractive, and the images displayed in the Popular Scientific Book are visible. The percentage of readability scores obtained in this aspect is 96.11%. According to Oktaviani et al. (2021), The graphic aspect has five criteria, namely letter size with font 16-28 and readable, empty spaces that do not contain text or images have been used to add contrast, use of pictures in Popular Scientific Books, use of color in Popular Scientific Books of more than four colors, and the use of various insert shapes with a score of 100% is said to be valid. Danaswari et al. (2013); Junaidi et al. (2023) stated that the visual presentation of graphics, namely graphic media, attracts attention, clarifies the material, and illustrates the facts contained in the teaching material.

Based on the results of the practicality test, the practicality score percentage obtained in this Popular

Scientific Book is 93.33%, so based on the criteria for assessing students' practicality according to Purwanto (2012), it is classified in the very good category. There are several differences in the assessment of students based on criteria 1 to 4. Several assessment items get grades 3 and 4. This is because each student has a different view and interest in the Popular Scientific Books being developed. This illustrates that students understand and comprehend the material presented in the Popular Scientific Book, which can support the Phanerogamae course overall. There are various assessments from students, namely assessment items that get grades 3 and 4 because students have different views and tastes; in some assessments, such as fonts that need to be bolded to make them easier to read and images that need to be made more explicit. All suggestions from students have been corrected. The Popular Science Books that have been developed show very good criteria, thus showing that the enrichment material in the form of Popular Science Books is easy to understand and easy to use in learning. Based on the validity and readability tests that have been carried out, the teaching materials developed in the form of a Popular Scientific Book on the Diversity of Types of Semar (Nepenthes) in the Forest Area of Tanta Village, Tabalong Regency, have obtained results that can be used as enrichment material in learning in the Phanerogamae course where has met the requirements of a very practical by practicality test.

The advantage of the Popular Scientific Book on the Diversity of Types of Semar (Nepenthes) Pouches in the Forest Area of Tanta Village, Tabalong Regency, which was developed, is that it contains information on local plants, especially on this study which is not available in the Popular Scientific Book other. The developed Popular Scientific Book contains pictures of native pitcher plants in the field to provide a direct picture of the morphology and condition of the bush plants in the red soil area. The material in Popular Scientific Books is equipped with questions aimed at motivating students to think creatively and is supported by valid reference sources for material from scientific journals. The use of language in Popular Scientific Books is by PUEBI and is easy for students and ordinary people to understand; it is equipped with a glossary to help readers understand foreign terms in Popular Scientific Books. It is hoped that the development of teaching materials in the form of Popular Science Books can become enriching material that broadens students' knowledge horizons in studying learning objects in their environment so that it can make it easier to understand the concepts being taught, especially learning Biology. The Popular Scientific Book Diversity of Types of Semar Pouches (Nepenthes) in the Tanta Village Forest Area, Tabalong Regency, which has been developed, has received a positive response from students who use it. Students' responses show interest in the images

presented, motivating them to learn. Popular Science Books are also new teaching materials introduced to the Phanerogamae course, which makes them interested in using Popular Science Books in the learning process.

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D. Conclusion

Based on the results of research and data analysis, the Popular Scientific Book "Diversity of Semar Bag Species (Nepenthes) in the Forest Area of Tanta District, Tabalong Regency," obtained a very valid and very practical category. The results of this study indicate that the popular scientific book prepared can be used further to test its effectiveness on the learning process and outcomes.

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