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The feasibility of tropical pitcher plant (*Nepenthes* sp.) exploration booklet as a learning media

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Abstract

Learning media is designed to arouse curiosity and increase students' knowledge. If only listening to verbal information from the teacher, students are more likely to ignore what is being taught. Therefore, the use of learning media has proven to be effective. Currently, learning materials are sourced from textbooks. This study aims to determine the feasibility, practicality, and effectiveness of a booklet developed from the inventory of pitcher plants (*Nepenthes* sp.) as a learning medium for high school/MA students. The research stages include the needs analysis stage, the booklet planning stage, the booklet creation stage, the validation stage, the trial stage, and the multiplication of booklet prints. The research instruments are in the form of validation sheets and questionnaires. Material experts and design experts assess validation. The practical tests of students and teachers include evaluating the booklet's physical appearance and overall content. The validation assessment was 88.6% and 90.4% "very valid" by design and material experts, respectively. The product's practicality based on the responses of students and teachers obtained a result of 96.7%, and the product's effectiveness got a result of 94% with the category of "excellent." This data shows Indonesia's biodiversity is a force that can be developed to meet the opportunities and challenges in education.

Abstrak

Media pembelajaran dirancang untuk membangkitkan rasa ingin tahu serta menambah ilmu pengetahuan siswa. Jika hanya mendengarkan informasi verbal dari guru, siswa lebih cenderung mengabaikan apa yang diajarkan. Oleh karena itu, penggunaan media pembelajaran terbukti efektif. Saat ini, materi pembelajaran bersumber pada buku teks. Penelitian ini bertujuan untuk mengetahui kelayakan, kepraktisan dan keefektifan buklet yang dikembangkan dari inventarisasi tumbuhan kantong semar (*Nepenthes* sp.) sebagai media pembelajaran bagi siswa SMA/MA. Tahapan penelitian yang dilakukan meliputi tahap analisis kebutuhan, tahap perencanaan buklet, tahap pembuatan buklet, tahap validasi, tahap uji coba, dan perbanyakan cetakan buklet. Instrumen penelitian berupa lembar validasi dan kuesioner. Validasi dinilai oleh ahli material, ahli desain. Uji praktis oleh respon siswa dan wawancara guru dalam menilai penampilan fisik dan keseluruhan isi buklet. Penilaian validasi yang diperoleh sebesar 88,6%, 90,4% “sangat valid” masing-masing oleh ahli desain dan ahli material. Kepraktisan produk berdasarkan respon siswa dan guru memperoleh hasil 96,7%, dan keefektifan produk memperoleh hasil 94% dengan kategori “sangat baik”. Data ini menunjukkan keanekaragaman hayati di Indonesia adalah kekuatan yang dapat dikembangkan untuk menghadapi peluang dan tantangan dalam pendidikan.

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A. Introduction

Education has a significant influence on the development of a country. Therefore, good and quality education can produce the next generation of a superior nation. In the world of education, its implementation seeks to improve the quality of education. One of the efforts made to improve the quality of education in Indonesia is to improve the education system by improving infrastructure, changing the curriculum, quality educators, and other aspects.

If there is no equitable distribution of facilities, and infrastructure in the educational process, it will have an impact on student learning achievement and decreased interest and enthusiasm for learning so that students' potential cannot develop (Lusi, 2019). This form of effort is also an improvement to create a society that can compete and adapt to the time (Nugroho, 2012; Paramita et al., 2018).

Implementing learning activities cannot be separated from the critical role of educators as a supporting factor in the excellent running of teaching and learning activities. Educators must master suitable learning methods and media to support a quality teaching and learning process (Shidiq & Faikhamta, 2020). Furthermore, Riyanto (2015) stated that a professional educator not only needs to prepare learning materials but is also required to be creative in using and developing learning media.

Learning media is one of the supporting aspects as an intermediary in conveying messages or information, a form of stimulus for thinking, interests, feelings, and desires of students so that they can support the smooth running of the learning process activities because learning media can facilitate teacher interaction with students (Atiko, 2019). According to Anggraeni et al. (2020), media spending increases interest and learning motivation, lowers the level of boredom in the classroom, and increases the value of students. The designed learning media must also be able to arouse students' curiosity. If you only listen to verbal information from educators, students will tend not to understand the learning that is conveyed well. This is represented by Magdalena et al. (2021), educators can increase student learning motivation by developing learning strategies, including methods and media used in the learning process. According to Alfazani & Khoirunnisa (2021), students are allowed to develop their potential through interests, talents, environment, and self-disclosure. On the other hand, through learning media, students can also observe, perform, and demonstrate to make learning more meaningful. This follows the previous opinion that using media during learning aims to enable students to form their concepts (Hanik et al., 2018).

The selection of learning media must be carefully planned and determined and even designed to solve learning problems, learning quality, interest in learning, student activity, and motivation (Ruqiah et al., 2021). Learning media can also be used in the learning process and the information you want to convey. In connection with the selection of media, many types of learning media can be used in the learning process, both visually, audio, and audio-visually (Wulandari et al., 2020).

A booklet is a visual print media that can be used in learning. Booklets have the advantage that they can be used at any time because they are in the form of books and can be learned independently by students, messages or information are relatively more concise and dense and designed to be attractive to foster students' interest in reading them. According to Roza (2012), the booklet has some functions, namely: to inflict interest educational goals, help inside overcome many obstacles, support the goal education to learn more and fast, stimulating educational purposes for forward received messages to someone else, to make delivery more straightforward academic language, to make it the easier discovery of information by educational goals, encourage people's desire to know then dive in and finally get a better understanding, helping clarify the knowledge gained.

This booklet has various forms and information, one of which is the pitcher plant inventory booklet which discusses Biodiversity material with a discussion of gene level uniformity, species, and ecosystem levels focusing on pitcher plants. So it is hoped that the pitcher plant inventory booklet can be used as a source of learning media for high school/MA students to instill an attitude of caring about the preservation of flora uniformity and maintaining those in the surrounding environment. Based on this description, the research made a booklet and tested the feasibility for use in the material of biodiversity class X SMA.

B. Material and Method

The type of research used is to use the Research and Development method. Research and Development (R&D) research is a research development research that is a research method where the final result of the research is in the form of a certain product and tests the effectiveness of

the product. Research on the development of a product is considered to take a long time or is longitudinal (gradual) (Sugiyono, 2015: 407). Research and development is a series of processes or steps in order to develop a new product or improve an existing product so that it can be accounted for (Fitriasih et al., 2019). The method used is a qualitative descriptive method, the preparation and development of this booklet follows the 4-D (four-D) development model by Thiagarajan (1974) with the stages of define, design, develop and disseminate.

This research was conducted from August 2021 to February 2022. The implementation of the Booklet was it is carried out by exploratory means in the form of recording all types of pither plant found at each location. The data collection instruments used in this study, namely: field research sheets, material content expert validation questionnaire sheets, design experts, biology teachers and student response questionnaire sheets. To find out the feasibility of the booklet that has been developed, a validation questionnaire sheet is used that will be filled out by material content experts and design experts. The assessment score (likert scale) of each score description can be seen in the Table 1 developed by Sugiyono (2015). The score obtained from the validator's assessment results is then processed in percentage form using Formula 1 from Ananda (2021).

Table 1 Validator Score and Explanation

Score	Explanation
4	Very Valid
3	Valid
2	Less Valid
1	Very Less Valid

$$P = \frac{f}{N} \text{ x } 100\% \text{.....Formula 1}$$

Description:
P = Percentage of validity
f = Number of validator scores
N = Maximum number of scores

Table 2 Criteria of the Validity Percentage

Percentage Rate	Criteria	Explanation
75%-100%	Very Valid	Worth/not revision
56%-75%	Valid	Pretty decent/not revision
41%-60%	Less Valid	Less feasible/partial revision
0%-39%	Very Less Valid	Not worth/revision

After searching for the percentage of validity, the next step is to convert the percentage result into a percentage score to determine the eligibility of the booklet adjusted to the validity criteria which can be seen in Table 2.

The achievement of the value obtained later interpreted based on criteria validity of the assessment result data. Every criteria can be declared feasible if it reaches percentage rate 56%-75%. Related comments and suggestions for improvement are made to perfect the booklet before being tested on students. Data acquisition from the student response questionnaire will be analyzed classically using the Formula 2. The results of practicality data in the form of percentages are then matched with a Table 3 of student response criteria.

$$P = \frac{f}{N} \text{ x } 100\% \text{.....Formula 2}$$

Description:
P = Percentage of practicality
f = The number of scores obtained
N = Maximum number of scores

Table 3 Percentage of product practicality score

Scores	Criteria
76%-100%	Excellent
51%-75%	Good
26%-50%	Good enough
≤ 25%	Bad

After the practicality of the product is known, an analysis of the effectiveness of teaching materials from the achievement of students completing the learning outcomes test (completeness of learning outcomes) is carried out. The maximum score of the learning outcomes test is 100 points and the Minimum Completion Criteria (KKM) set at 75 points. In the percentage of completion based on the completeness table of learning outcomes as follows. In calculating the percentage of completion of learning outcomes through the Formula 3.

$$KB = \frac{T}{Tt} \text{ x } 100\% \text{.....Formula 3}$$

Description:
KB = Completeness of learning
T = Number of students with a < score of 75
Tt = Total number of students

Then, the calculating of learning outcomes completion percentage is adjusted to the following assessment categories in Table 4. Based on the effectiveness analysis above, the resulting product

is included in the effective category if the test results are classified as at least "good" categories.

Table 4 Criteria for Student Learning Completion Test Results

Scores	Criteria
$x \geq 80\%$	Very Good
$60\% \leq x < 80\%$	Good
$40\% \leq x < 60\%$	Good enough
$20\% \leq x < 40\%$	Less
$x \leq 20\%$	Very Less

(Source: Ananda, 2021)

C. Results and Discussion

Based on the results of exploration in the sampling study carried out in an exploratory manner from August 2021 to February 2022 about the uniformity of pitcher plant species in three different observation sites that have been carried out, eight species were found listed in Table 5.

Seven of eight species of which are natural species and one of them, namely *Nepenthes xhokeriana*, is a species resulting from a natural cross between *Nepenthes rafflesiana* and *Nepethes ampularia*. To find out the feasibility of the booklet learning media developed, validation is carried out by material experts and design experts. This is in line with research conducted by Sagita et al. (2020) which states that validation results obtained from learning tools are feasible to use and implied after meeting feasible and practical criteria. After that, further actions can be taken in the form of product testing. Agree with Ernawati & Sukardiyono (2017) stated that the product can be tested after the product validation. The research results can be seen in Table 6.

Table 5 Data on the Findings of Pitcher Plant

No	Species
1	*Nepenthes gracillis*
2	*Nepenthes mirabilis*
3	*Nepenthes ampularia*
4	*Nepenthes tobaica*
5	*Nepenthes spectabilis*
6	*Nepenthes rafflesiana*
7	*Nepenthes rainwardtiana*
8	*Nepenthes xhokeriana*

Based on the results in Table 6, showing the percentage of design experts obtained as much as 88,6%, based on the validation assessment criteria in Table 2, the product based on the design expertise is in the **very valid** category with captions **worth/not revision**. And as for the input given focusing on the writing procedure, this follows Fadil et al. (2017) mention if the suitability of the type and size of the letters used affects the readability of the media so that it is easy for readers to read. In addition, Muswita et al. (2020) added that combining colors and images influence readers' interest in reading. So that the background cover must have a bright color, avoid placing excessive photos because it can confuse readers in focusing on the writing or the image. It is still allowed to include the picture but does not detract from its beauty (aesthetics).

Table 6 Data from Validation Analysis Results

Validators	Suggestions for improvement	%	Criteria
Design expert	There is no specific note, because the booklet is said to be good, has gone through the guidance and validation stage periodically and can be continued for trial.	88,6%	Very valid
Material expert	There is no specific note, because the booklet is said to be good, has gone through the guidance and validation stage periodically and can be continued for trial.	90,4%	Very valid

Then based on the results of the material expert assessment, 90.4% of the assessment results were obtained with a **very valid category** with captions **worth/not revision**. The assessment includes aspects of material conformity with basic competencies (KD), aspects of material accuracy, aspects of material update, and aspects of encouraging curiosity. As in the booklet has been listed the fundamental component of these aspects. This follows the opinion of Rukmana et al. (2018) that the booklet should include KI, KD, Indicators, and Learning Objectives. Utami (2012) also mentioned things that must be considered in developing booklets as teaching materials, including material coverage, accuracy, and material update. Prastowo's (2015) opinion supports the encouraging curiosity aspect that interesting teaching materials can encourage curiosity to motivate students to read and ask questions.

After obtaining validation results from two validators (material experts and media experts), the product is tested for the practicality of the product, which is a test carried out on the product through the responses of teachers and students. Annisa et al. (2020) said that the purpose of conducting a practicality test is to test whether the development product is practical and easy to use by users. Added Alfiriani & Hutabri (2017) stated that learning media is easy to use so that the learning carried out can be meaningful, interesting,

fun, and valuable for students' lives, and it can increase their creativity in education. Therefore, this test was carried out to see if the product is practical and has a distinctive character as a learning medium for high school/MA students by asking 10 statements about the pitcher plant inventory booklet product as a learning medium. The results of the practicality test conducted on students can be seen in Figure 1.

Abidin (2016) stated that the product's practicality is a criterion that is considered in selecting products to support the learning process; in this case, the booklet is considered practical in its use. Therefore, a percentage of the practicality of 96.7% was obtained. Therefore, based on the product practicality criteria in Table 3, it could be concluded that the product practicality test by student responses with the "**Excellent**" category. Then a practical test was carried out on the teacher's response regarding the Pitcher plant inventory booklet as a learning medium. The assessment presentation can be seen in Table 7.

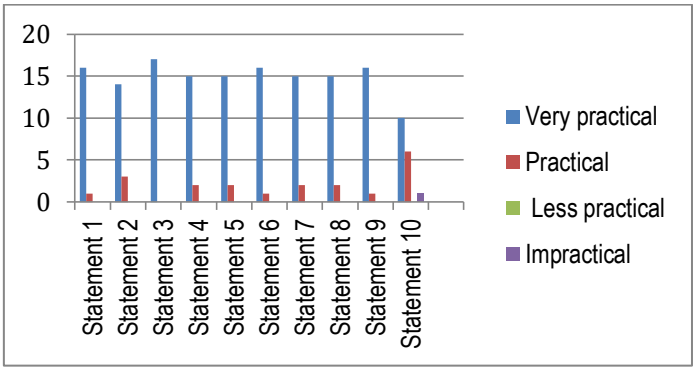

Figure 1 Product practicality data through student response

Table 7 Data on Product Practicality through Teacher Response

Assessment Indicators	Assessment Items	Value gain
Relevance of the Material	The relationship between the content of the material and the material taught	4
	The accuracy of the content of the material in the booklet presented (in accordance with the real science)	4
Knowledge Construction	The relationship of the content of the material to the understanding of students	3
	The breadth of knowledge contained in the Booklet according to the students' understanding	3
	Language Suitability (EYD compliant, does not contain SARA, and corresponds to latin spelling)	4

Continued in this case, the teacher will also assess the appearance of the booklet product, starting from the cover, design, image, and content format. In addition, the content of the booklet material will also be assessed by the relevant teacher to adjust the material's content to the teaching material used in learning activities so that the assessment results of 90% are in the "**Excellent**" category. Several suggestions are given based on the assessment results, including the content of the material displayed in the booklet added back and, of course, related to the related material. The overall appearance is very suitable and attractive, and the size is practical.

Product effectiveness tests are also carried out with the results of student and teacher responses related to the practicality of the product. This effectiveness test aims to determine whether the developed booklet is effective as a learning medium or a source of learning reference. Sari & Susanti (2016) said that the effectiveness test was carried out to determine the influence on increasing activities and learning outcomes. The effectiveness test is made by knowing the completeness of student learning after using the developed booklet. At this stage, researchers carry out learning activities using the Biology Booklet and then distribute the question sheets to students to evaluate learning completion. The questions given previously have been validated by the question validator so that they have met the terms and conditions before testing the students. Based on the results of completing learning from the effects of student work learning, data can be obtained in Table 8.

Table 8 Learning Completion Value Data

Student	Score	Category
1	100	Complete
2	90	Complete
3	90	Complete
4	100	Complete
5	90	Complete
6	90	Complete
7	80	Complete
8	100	Complete
9	70	Uncomplete
10	80	Complete
11	100	Complete
12	90	Complete
13	90	Complete
14	80	Complete
15	90	Complete
16	100	Complete
17	90	Complete
Conclusion	**94%**	**"Very Good"**

Table 9 Data the Results of Interviews with Biology Teacher

Question	Answer
Can the pitcher plant Inventory Biology Booklet (*Nepenthes* sp.) support the needs of teachers as a source of learning in teaching?	Based on the topic of biodiversity learning, this booklet can support the needs of teachers as a learning resource to explain variations of pitcher plant species. Students also not only know the variety of types, but of course know more about the characteristics of the pitcher plant.
Can the teaching materials of the pitcher plant Inventory Biology Booklet (*Nepenthes* sp.) help students understand the biological uniformity material?	The booklet on the pitcher plant Inventory (*Nepenthes* sp.) can support students' understanding of biodiversity, especially in rare and rarely known living things (plants or animals).
How are students interested in and responding to the pitcher plant Inventory Biology Booklet (*Nepenthes* sp.)?	Students are enthusiastic about observing the diversity of types of pitcher plant described in the booklet. In addition, students are also invited to observe the shape, habitus, characteristics, and examples of pitcher plant.
What are the advantages and disadvantages of the pitcher plant Inventory Biology Booklet (*Nepenthes* sp.)?	Advantages of Booklet: 1) This booklet has attractive images, colors, paper types, and presentations so it is suitable for all circles (students, teachers, general readers 2) This booklet contains material or sentences that are light to read and easy to understand 3) This booklet is very pocketable so it is easy to store and can be read anywhere and anytime 4) The pitcher plant material presented is so rich that the reader is familiar with the various pitcher plant found in Indonesia Disadvantages of Booklet : 1) Although the images displayed are attractive, the arrangement of the images still seems untidy because they are arranged simultaneously 2) The material is further enriched by displaying the geography and habitus state of the pitcher plant
Is there a desire for teachers to use the learning resources of the pitcher plant Inventory Biology Booklet (*Nepenthes* sp.)?	Of course, there is a reason that the addition of learning literacy will certainly increase the insight of teachers' knowledge of biodiversity in Indonesia, so that teachers can provide indirect experiences to students when teaching and learning activities (KBM) take place in the classroom

Obtaining the results of data on the completion of learning outcomes through questionnaires is given to determine the factors causing the incompleteness of learning outcomes obtained by students (Sugiyono, 2016). The results above show that as many as 94% of students are in the "**Very good**" category, as for students who do not pass as many as 1 students. It is known that the factors causing insincerity are the mental retardation of students who are less active in socializing with other students and are more reserved and less engaged in learning. So the solution can be in the form of special attention to learning activities, for example, providing a more profound understanding than other students, providing motivation to learn, and practicing social relationships (Jazim et al., 2018). In addition, Nugroho (2012) that efforts in increasing learning activity include attention, cooperation, and social relations, expressing opinions or ideas, problem-

solving, and discipline. The practicality test of the product based on the teacher's response states that the images presented are referenced and interesting. Istifarida et al. (2017) mentioned that learning media must contain straightforward content and be supported by appropriate images to convey the meaning or content described effectively.

In addition, it is stated based on the teacher's assessment of the practicality of the product stating if the product in writing the suitability of the text and images is appropriate. As mentioned by Rizawayani et al. (2017) that this is the most important aspect and can build motivation in learning Sari et al. (2017). And these criteria have been met in the inventory booklet of pitcher plant. In the practicality test to the teacher's response, an interview is also carried out. The results of the product practicality test data by the teacher's response through interviews in the data presentation are as follows (Table 9).

D. Conclusion

The booklet developed based on the Inventory of Tropical Pitcher Plant can be used as one of the learning media for the Biology learning process for high school students. The validation assessment was very valid by design and material experts, obtained practical student and teacher responses, and got an excellent category for product effectiveness. This data shows Indonesia's biodiversity is a force that can be developed to meet the opportunities and challenges in education. Learning by involving students' interactions with the environment, learning independence facilities, or studying biodiversity with examples close to students' lives can make learning exciting and easy to understand.

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