

# Development of Angiosperm Plants Booklet as A Biology Learning Media for Tenth Grade of Senior High School Students

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**Abstract:** The research aims to develop angiosperms plant booklets in the Mount Tidar Botanical Garden as a medium for biological learning and to know the feasibility of angiosperms plant booklets in the Mount Tidar Botanical Garden as a medium for biological learning. Development research includes Research and Development (R&D) research using ADDIE development models limited to the Analysis, Design, and Development stages. Booklets were developed using Canva software. Booklets that have been developed are then validated using assessment instruments including validation angket sheets and student response sheets. Booklet assessment was carried out by 1 material expert, 1 media expert, 1 biology teacher, and 15 students in grade X MIPA MAN 1 Magelang. The results of the product validity test assessment by both materialists and media experts showed that the validation with percentage of product assessment was respectively scored at 87% and 96% with excellent categories so that the product was said to be viable. The results of the validity test assessment of biology teachers and students showed validity with the percentages of 93% and 88% indicating "very good" categories. Based on the research results, the angiosperms plant booklets in the Mount Tidar Botanical Garden are well-suited and practically used as a medium for biological studies.

**Keywords:** Booklet, a medium of learning.

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## Introduction

Education is an effort to humanize humans. Humans are the highest creatures compared to other creatures. Humans are creatures given reason by God. Humans have been endowed with the ability to speak and reason by God. Therefore, education is a deliberate effort of more mature people who provide direction or guidance to students or students with the aim of fostering mental and spiritual until the term kamil human being is achieved (Arfani, 2016). Education provides a framework where learning occurs. Learning is an interaction between teachers and students in a learning environment and learning resources. Learning is a conscious, focused, and deliberate effort to help others gain meaningful experience. Biology learning in high school is

expected to be a means for students to get to know themselves and the natural environment around them and recognize the development process that can be applied in everyday life. Biology learning should be applied in accordance with the nature of science, which includes cognitive science, affective science, and psychomotor science. Biology learning is essentially a process of guiding students towards learning goals, and biology itself acts as a means to achieve these goals (Hasan, Nusantari, Latjompoh, & Nurrijal, 2017).

To increase learning motivation and clarify learning concepts and materials, learning media are needed. Learning media is one of the components that play an important role in the student learning process to achieve educational goals (Adlini, 2021). So by using learning media, teachers can be more structured in explaining the

material presented to students. Learning media consists of 4 types, namely print media, audio-visual media, computer media, and combined media between print media and computer media (Hanin & Lufri, 2023). One of the learning media in the form of printed media is booklets. Booklets have a simple form and have many colors and illustrations displayed. Booklets can be accessed without using an internet connection or electronic device, so they can be used by all students including students who may not have access to technology. Booklets provide references and information in a practical, inexpensive, and easily available manner. Booklets can be read anywhere and anytime so that they can help improve students' understanding of the material being taught (Imtihana, Martin, H.B, & Pritono, 2014). The advantages of this angiospermae plant booklet learning media can make it easier for students to understand the types of Angiospermae plants found in the Gunung Tidar Botanical Garden, besides that it also uses language that is easily understood by all groups. According to (Hasruddin, 2009) learning media is important to use in order to facilitate students in receiving biological material. Symptoms and facts found in the surrounding environment will also be more interesting if presented using learning media. This makes students interested in the learning process.

### Materials and Method

The type of research is Research and Development (R&D). The development model used is the ADDIE model. The ADDIE model was chosen because this model is one of the procedural models, this model is relatively simple and has advantages in systematizing its work (Sugiyono, 2015). The procedure in developing booklets was carried out by researchers by adapting the ADDIE model, but the research conducted was limited to the development stage. The analysis stage consists of three stages, namely problem analysis, goal analysis, and analysis of student needs. At the design stage, the identification of booklet product design and product format selection are carried out by designing the contents of the booklet. Booklet

design is carried out by adjusting the characteristics and rules for preparing booklets. Furthermore, the development stage, this stage is carried out by preparing learning media products using Canva software and conducting validity tests by material experts and media experts. Booklets that have been validated by experts are then tested on biology teachers and 15 students of class X MIPA MAN 1 Magelang.

The data collection instrument used was a questionnaire instrument for booklet validity by material experts and media experts, as well as a questionnaire instrument for practicality by biology teachers and students. The data obtained from filling out the questionnaire is then processed by conducting a validity test and reliability test, with the following formula:

a) Test the validity of material experts, media experts, and biology teachers using the Aiken's V formula:

$$V = \frac{S}{[n(c - 1)]}$$

Description:

V : Item validity index

S: r-lo

c : The highest validity assessment number

n : Number of raters

r : The number given by the rater

lo : The lowest validity assessment number

Validity testing using the microsoft excel program. To interpret the validity value obtained from the calculation, the validity classification shown in the table below is used:

Table 1. Klasifikasi koefisies validitas Aiken's (V)

Kriteria Validity	Validity
0,80<V≤1,00	Very high validity
0,60<V≤0,80	High validity
0,40<V≤0,60	Fair validity
0,20<V≤0,40	Low validity
0,00<V≤0,20	Very low validity

b) The student validity test uses the following formula:

$$r_{hitung} = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}}$$

Description:

- $r_{xy}$  : Correlation coefficient between item value and total value
- $n$  : number of samples x
- $\sum xy$  : the sum of the results of the multiplication between the x value and the y value
- $\sum x$  : the sum of all x values
- $\sum y$  : the sum of all y values
- $\sum x^2$  : sum of squares of x values
- $\sum y^2$  : sum of squares of y values

This validity test was carried out using the Microsoft Excel program with the following criteria:

- 1) If  $r_{count} > r_{table}$  then the statement is declared valid
  - 2) If  $r_{count} < r_{table}$  then the statement is said to be invalid
  - 3) The calculated r value can be seen in the corrected item total correlation column
- c) Reliability test

Reliability is the consistency of a method and research results. Reliability as the consistency of a research result using various research methods under different conditions (place and time). In particular, reliability refers to the consistency of the score results on the items contained in the instrument so that the reliability test actually tests the accuracy of the measurement scales of the research instrument (Budiastuti & Bandur, 2018). This reliability test uses statements that have been declared valid in the validity test and will determine their reliability using the Cornbach's Alpha formula. According to (Suhasaki, 2010), the Alpha formula is used to find the reliability of instruments whose scores are not 1 or 0, for example, questionnaires or description form questions. The Cornbach's Alpha formula is as follows:

$$\alpha = \left(\frac{k}{k-1}\right) \left(1 - \frac{\sum \sigma^2 b}{\sigma^2 t}\right)$$

Description:

- $\alpha$  : alpha reliability coefficient
- $k$  : number of question items
- $\sum \sigma^2 b$  : sum of item variances
- $\sigma^2 t$  : total variance

Reliability can be known from the Cornbach's Alpha value with the following criteria:

If the Cornbach's Alpha value  $> 0.70$  then it is said to be reliable  
 If the Cornbach's Alpha value  $< 0.70$  then it is said to be unreliable

d) Percentage of feasibility and practicality

If the data is said to be valid and reliable, then the next step is to calculate the percentage of feasibility and practicality of the average score of each component with the following formula:

$$\text{Presentase keidealan} = \frac{\text{skor hasil penelitian}}{\text{skor tertinggi ideal}} \times 100\%$$

The eligibility category can be adjusted in the table below:

Table 2. Rules of the idealized percentage scale for experts.

Assessment percentage (%)	interpretation
81-100	Very Decent
61-80	Feasible
41-60	Fair
21-40	Less Feasible
0-20	Not Feasible

Practicality categories can be adjusted in the table below:

Table 3. Idealized percentage scale rules for biology teachers and students.

assessment percentage(%)	interpretation
81-100	Very Practical
61-80	Practical
41-60	Fair
21-40	Less Practical
0-20	Not Practical

### Result and Discussion

The results of the product trial were carried out by material experts, media experts, biology teachers, and 15 students. the results of this test will show the feasibility of a product developed (Marlinda, Hanim, & Eriawati, 2023). The following is a description of the results of the product feasibility test assessment:

### 1) Material Expert Assessment

Material expert validation aims to validate the material and questions presented on the learning media. The results of the product validity test by material experts can be seen in table 4 below:

**Table 4.** The results of the validity test by material experts.

Aspect	Item	V	Description
Content quality	1-5	1	Very high validity
Presentation quality	6-8	0,923	Very high validity
Language quality	9-13	0,952	Very high validity
Average V score		0,846	Very high validity

The results of the validity test by material experts show that the angiosperms booklet as a whole has a very high level of validity with a V value of 0.846 obtained from the results of the

validity of the content quality aspect 1, the validity of the presentation quality aspect 0.923, and the language quality aspect 0.952. As for the reliability test can be seen in table 5 below:

**Table 5.** Reliability test results by material experts.

Reference value	Value cornbach's Alpha	Conclusion
0,70	3,575	Reliabel

The results of the reliability test by material experts show that the booklet of angiosperms plants is reliable to be used as a medium for learning biology for class X SMA / MA students. For media feasibility assessment by material experts can be seen in table 6 below:

**Table 6.** Results of feasibility assessment by material experts.

Aspect	$\Sigma$ Skor Maks.	$\Sigma$ Skor	Persentase (%)	Category
Content quality	25	25	84%	Very feasible
Presentation quality	15	14	93%	Very feasible
Language quality	25	22	88%	Very feasible
Total	65	57	87%	Very feasible

The results of the assessment by material experts show that the booklet of angiosperms plants in the Gunung Tidar Botanical Garden as a whole has very good quality with an ideal percentage of 87% obtained from the results of the content quality aspect of 84%, the presentation quality aspect of 93%, and the linguistic quality aspect of 88%.

### 2) Media Expert Assessment

Media expert validation aims to provide advice on the results of the media developed. Media experts will assess the design of learning media to help improve the quality of learning media. The results of the product validity test by media experts can be seen in table 7 as follows:

**Table 7.** Results of validity test by media experts.

Aspect	Item	V	Description
Booklet size	1-2	2,22	Very high validity
Graphics	3-11	0,47	Medium validity
Integrity and balance	12-15	1,11	Very high validity
Booklet quality	16	5	Very high validity
Average score V		0,953	Very high validity

The results of the validity test by media experts show that the booklet as a whole has a very high level of validity with a V value of 0.953 obtained

from the results of the validity of the booklet size aspect 2.22, the validity of the graphical aspect 0.47, the aspect of integration and balance 1.11, and the

quality aspect of the booklet 0.952. As for the reliability test can be seen in table 8 below:

Table 8. Reliability test results by media experts.

Reference value	Value cornbach's Alpha	Conclusion
0,70	6,256	Reliabel

The results of the reliability test by media experts show that the angiospermae plant booklet is reliable to be used as a learning media for biology students in class X SMA / MA. For media feasibility assessment by media experts can be seen in table 9 below:

Table 9. Results of feasibility assessment by media experts.

Aspect	Σ Skor Maks.	Σ Skor	Persentase (%)	Category
Booklet size	10	10	100%	Very Good
graphics	45	43	95%	Very good
Integrity and balance	20	19	95%	Very Good
Booklet quality	5	5	100%	Very Good
Total	80	77	96%	Very Good

The results of the assessment by media experts show that the booklet as a whole has very good quality with an ideal percentage of 96% obtained from the results of the booklet size aspect 100%, the graphic aspect 95%, the aspect of integration and balance 95%, and the quality aspect of the booklet 100%.

### 3) Biology Teacher Assessment

The results of the validity test by biology teachers on learning media products can be seen in table 10 below:

Table 10. Results of validity test by biology teacher.

Aspect	Item	V	Description
Illustration of contents	1-2	0,88	Very high validity
Content quality	3-8	0,92	Medium validity
Presentation quality	9-11	1,33	Very high validity
Language quality	12-16	0,90	Very high validity
Applicability	17-18	1	Very high validity
Average Score V		0,916	Very high validity

The results of the validity test by the biology teacher show that the booklet as a whole has a very high level of validity with a V value of 0.953 obtained from the results of the validity of the content illustration aspect of 0.88, the validity of the content quality aspect of 0.92, the validity of the presentation quality aspect of 1.33, the validity of the language quality aspect of 0.90 and the validity of the implementation aspect of 1. As for the reliability test can be seen in table 11 below:

Table 11. Reliability test results by biology teachers.

Reference value	Score cornbach's Alpha	Conclusion
0,70	4,125	Reliabel

The results of the reliability test by the biology teacher show that the angiospermae booklet is reliable to be used as a learning media for biology students in class X SMA/MA. For media feasibility assessment by biology teachers can be seen in table 12 below:

**Table 12.** Results of feasibility assessment by biology teacher.

Aspect	$\Sigma$ Skor Maks	$\Sigma$ Skor	Persentase (%)	Category
Illustration of contents	10	10	100%	Very good
Content quality	30	27	90%	Very good
Presentation quality	15	15	100%	Very good
Language quality	25	23	92%	Very good
Applicability	10	9	90%	Very good
Total	<b>90</b>	<b>84</b>	<b>93%</b>	<b>Very Good</b>

The results of the assessment by the biology teacher showed that the booklet as a whole had very good quality with an ideal percentage of 93% obtained from the results of the content illustration aspect 100%, the content quality aspect 90%, the presentation quality aspect 100%, the language quality aspect 92%, and the implementation aspect 90%.

**Table 13.** Results of validity test by students.

Aspect	Item	V	Description
Attractiveness	1-5	0,911	Very High Validity
Content appropriateness	6-10	0,903	Medium Validity
Language	11-12	0,944	Very High Validity
Applicability	13-14	0,909	Very High Validity
Average score V		0,913	Very high validity

The results of the validity test by students show that the booklet as a whole has a very high level of validity with a V value of 0.913 obtained from the results of the validity of the interest aspect of 0.911, the validity of the content eligibility aspect of 0.903, the validity of the language aspect of 0.944, and the validity of the implementation aspect of 0.909. As for the reliability test can be seen in table 14 below:

## 4) student response

The student trial was limited to 15 students of MAN 1 Magelang. This school was chosen because it is close to the Mount Tidar Botanical Garden. The table of the results of the validity test of students' responses to the booklet of angiospermae plants in Gunung Tidar Botanical Garden can be seen in table 13 below:

**Table 14.** Reliability test results by students.

Reference value	Value cornbach's Alpha	Conclusion
0,70	0,880	Reliabel

The results of the reliability test by students show that the angiospermae plant booklet is reliable to be used as a biology learning media for class X SMA/MA students. The assessment by students can be seen in table 15 below:

**Table 15.** Results of feasibility assessment by students.

Aspect	$\Sigma$ Skor Maks	$\Sigma$ Score	Persentase (%)	Category
Attractiveness	375	332	88%	Very good
Content quality	375	334	89%	Very good
Language	150	132	88%	Very good
Applicability	150	136	90%	Very Good
Total	1050	934	88%	Very good

Based on the results of student responses, it shows that the booklet as a whole has very good quality. This can be taken from several aspects, namely aspects of interest 88%, aspects of content feasibility 89%, aspects of language 88%, aspects of implementation 90%.

### Conclusion

Angiospermae plant diversity booklet is the result of research developed using the ADDIE development model, which consists of Analysis, Design, and Development. The analysis stage consists of analyzing problems, analyzing objectives, and analyzing student needs. The design stage consists of media selection and product format selection. The development stage consists of the booklet preparation stage and the booklet product validation stage. Validity and reliability tests by material experts and media experts show validity so that learning media products are said to be feasible. The validity and reliability tests by biology teachers and students showed validity, so that the angiospermae booklet learning media products were said to be practical and effective to use. The Angiospermae plant diversity booklet trial obtained the results of a percentage of 87% given by material experts in the very good category, a percentage of 96% by media experts in the very good category, a percentage of 93% by biology teachers in the very good category, and a percentage of 88% by students in the very good category. Based on the assessment obtained,

the booklet of Angiospermae plant species diversity in the Mount Tidar Botanical Garden is declared very feasible to use as learning media.

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