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Validation of Popular Scientific Books on the Results of Morphological and Anatomical Characterization of Binjai (*Mangifera caesia* Jack.)

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ABSTRAK

Validasi diartikan sebagai kebenaran suatu produk yang dikembangkan. Validasi bertujuan untuk mengetahui kevalidan suatu produk, contonya Buku Ilmiah Populer (BIP). BIP adalah karya tulis dengan bahasa sederhana dan mudah dipahami. Berisi tentang kegiatan sehari-hari kehidupan masyarakat. Tumbuhan binjai merupakan tumbuhan khas Kalimantan yang memiliki manfaat yang erat kaitannya dengan kearifan lokal. Penelitian ini bertujuan untuk mendeskripsikan validasi BIP hasil karakterisasi morfologi dan anatomi tumbuhan binjai. Metode penelitian menggunakan model pengembangan *Educational Design Research* (EDR) oleh Plomp yang dibatasi sampai tahap prototipe dengan menggunakan evaluasi formatif Tessmer. Subjek penelitian ini yaitu para ahli dan pengguna yang akan menilai BIP. Objek penelitian berupa produk BIP yang dikembangkan. Teknik pengumpulan data berupa kuesioner yang dibagikan kepada subjek penelitian. Hasil uji validitas oleh ahli menunjukkan BIP dikategorikan sangat valid dengan skor 85,42%. Hasil uji keterbacaan oleh pengguna menunjukkan BIP dikategorikan sangat baik dengan skor 95,83%.

Kata kunci: Binjai; BIP; EDR.

ABSTRACT

Validation is meant to be the truth of a product developed. Validation aims to determine the validity of a product, for example, in Popular Scientific Book (BIP). BIP is written in a simple and easy to understand. Contains about everyday activities that relate to the life of the community. Binjai is a typical Kalimantan plant that has benefits related to the local wisdom. This research aims to describe validation of BIP resulting from the morphology and anatomy characterization of binjai. This research method uses an EDR by Plomp that is limited to the prototype stage and using Tessmer's formative evaluation. The subject of this research is the experts and users who will evaluate BIP. The data collection technique is a questionnaire distributed to the research subjects. The validity test showed that the developed BIP was categorized as very valid with score 85.42%. Readability the development BIP is categorized very well with score 95.83%.

Keywords: *binjai; BIP; EDR.*

INTRODUCTION

Validation refers to the truth of a product that is developed by asking for assessments and responses from experts who are experts in their fields (Ibrahim & Subali, 2017). According to Putri et al. (2020), a product that is developed is considered valid or good if it is in accordance with the product assessment criteria. Validation of a product that is developed can be achieved by conducting tests by experts who are experts in their fields and users who will be the target of the product. Testing by experts is in the form of a validity test, while the test carried out on users is in the form of a readability test. Validation is an activity carried out in the research and development of a product, the purpose of validation is to find out the assessment of a product by the validator (Nurfatma et al., 2020).

Learning is an activity that can be experienced by every individual who has reason and occurs without regard to time and place. Learning requires supporting factors that are useful as a support in learning, one of which is learning resources. Learning resources can be found in printed form in the form of books, non-printed forms in the form of videos and audio, in the form of facilities, and so on. Printed sources are categorized into books, magazines, posters, and floor plans.

Books are divided into several types, for example booklets, encyclopedias, pocket books, dictionaries, atlases, Popular Scientific Books (BIP), and so on. BIP is a book measuring 14.8 cm × 21 cm, written in casual and non-standard sentences and easy to understand by its readers (Sari, 2019). This is in accordance with LIPI (2019) which states that BIP is a scientific written work, written in language that is easy to understand by the general public.

Plant morphology is a branch of biology, discussing the composition and physical form of the plant body. Meanwhile, plant anatomy is a branch of biology, discussing the composition and form of the internal parts of the plant body (Hasanah et al, 2021). Discussions related to the morphology and anatomy of binjai plants can be found in school, even discussions about morphology can also be seen in our daily lives..

The binjai plant is one of the endemic species typical of South Kalimantan. The binjai plant is a tropical plant related to the mango with a distinctive aroma of its fruit and a very distinctive sour taste (Rai et al., 2008). The parts of the binjai plant that are usually used by the Banjar community are the stem, leaves, and fruit. The binjai stem is usually used as a board for building houses. Binjai leaves are used as a medicine for kabibinjaian disease. Binjai fruit is used by the community by consuming it directly or as a complement to a dish.

The developed BIP contains explanations related to morphological and anatomical characters made in simpler language that is easy to understand in general, and several interesting pieces of information are inserted that are still related

to the binjai plant. The developed BIP also contains information about the use of binjai plants in the form of the use of leaves as medicine to the benefits of the fruit which is used as a complement to Banjar cuisine..

Based on the explanation above, researchers are interested in conducting research on BIP validation which raises the theme of morphological and anatomical characters of binjai plants along with their utilization which is closely related to local wisdom of the community. It is hoped that this research can add to and increase the literature on binjai plants which is still limited.

METHOD

The development of local wisdom-based BIP is included in educational design research or Educational Design Research (EDR). According to Setyosari (2010) educational design research or EDR is one type of product development research. The stages of EDR implementation are: preliminary research stage, prototype stage or prototyping stage, and assessment phase (Plomp et al., 2007).

The development research used in this study refers to the development stages by Plomp (2007) which are limited to the prototype stage only. The preliminary research stage is carried out by analyzing the needs related to the product to be developed, observing the research location, determining research samples, measuring environmental parameters, observing morphological and anatomical characters, and conducting interviews related to local wisdom. The prototype stage is carried out by developing the product based on the field data obtained, then the product will be evaluated using Tessmer's formative evaluation stage..

A product that is developed is declared good must go through a validation stage. The product that is developed is considered valid or good if it is in accordance with the product assessment criteria (Putri et al., 2020). The validation process to evaluate the product developed in this study used the Tessmer formative evaluation design. Tessmer's formative evaluation has several stages, namely the self-evaluation stage, expert review, individual evaluation (one to one evaluation), small group evaluation, and field test evaluation (Zaini, 2018). The stages of the formative evaluation carried out are limited to the individual evaluation stage only. The reason for the development of this BIP is limited to the individual evaluation stage only due to the limited research time..

The developed BIP was assessed using a validity test at the expert review stage. The purpose of the validity test carried out by experts (validators) was to assess the feasibility of the BIP created by researchers before being tested on users. The instrument used in this validity test was a questionnaire or survey adapted from Rakedzon & Baram-Tsabari (2017). The formula used to calculate the validity test score was adopted from Akbar (2022).

$$V = \frac{Tse}{Tsh} \times 100\%$$

V : Validity
T_{se} : Total validation score from validators

T_{se} : Total maximum expected score

The results of the calculation will be adjusted to the validity test criteria adopted from Akbar (2022) which can be seen in Table 1.

Table 1. Validity Test Criteria

Validity Criteria	Validity Level
85,01%–100,00%	Very valid, or can be used without revision.
70,01%–85,00%	Fairly valid, or usable but needs minor revisions.
55,01%–70,00%	Less valid, recommended not to use because it needs major revision.
01,00%–50,00%	Invalid, or cannot be used.

(Source: Akbar, 2022)

After conducting the validity test and the resulting data shows a very valid category, it can be continued to the readability test stage. The readability test is carried out to determine the readability assessment or intrinsic assessment of the BIP content made by the researcher. The instrument used in this readability test is a questionnaire or survey adapted from Zaini (2018). The formula used to calculate the readability test score is adopted from Sugiyono (2017).

$$\text{Score} = \frac{Total\ Score}{Total\ Maximal\ Score} \times 100\%$$

The results of the calculations will be adjusted to the readability test criteria adopted by Sugiyono (2017) which can be seen in Table 2..

Table 2. Readability Test Criteria

Readability Criteria	Readability Level
85%–100%	Very Good
70%–< 85%	Good
60%–< 70%	Enough
50%–< 60%	Low
< 50%	Very Low

(Source: Sugiyono, 2017)

The research was conducted from November 2022 to July 2023. The subjects of the research were 3 expert lecturers to test the validity of the BIP and 6 users to test the readability of the BIP. The 6 users were divided into 3 students and 3 members of the general public. The criteria for students selected were those who had

taken Plant Morphology and Plant Anatomy courses. The criteria for the community selected were those aged 15-50 years with diverse backgrounds. The object of the research was the BIP developed.

RESULTS AND DISCUSSION

Validation is an activity carried out in developing a product, the purpose of validation is to determine the assessment of a product by the validator (Nurfatma et al., 2020). A product that is developed is declared good must go through a validation stage. The validation process to evaluate the product developed in this study uses the Tessmer formative evaluation design. Expert review at the Tessmer formative evaluation stage is used to test the validity of the BIP product developed by the researcher. The validity test was carried out by three lecturers who are experts in the field of plant morphology and anatomy. The BIP validity test that was assessed consisted of several aspects, namely coherence, readability, vocabulary, active and passive sentences, format, writing methods, applications and implications, definitions and explanations, and other styles of devices: narrative, humor, and analogy. The BIP product developed by the researcher is shown in the following figure.

Figure 1. BIP Design by Researcher

The instrument used in the validity test was a questionnaire adapted from Rakedzon & Baram-Tsabari (2017). The results of the assessment of each aspect of the BIP validity test developed by the researcher will be analyzed and adjusted to the criteria adopted from Akbar (2022).

Table 3. Validity Test Results

Assessment Aspects	Statement	Validator			Tse	Tsh	Persentase	Validity Category
		I	II	II				
Coherence	1. Each paragraph in the BIP has one main idea.	3	3	3	39	48	81,25%	Enough

Assessment Aspects	Statement	Validator			Tse	Tsh	Persentase	Validity Category
		I	II	II				
	2. Connecting sentences using conjunctions.	3	3	3				
	3. Ideas are presented sequentially.	3	3	4				
	4. The sentence has directed the reader to understand the contents of the book.	3	4	4				
Legibility	5. The text is appropriate for age/education level.	3	3	3	18	24	75%	Enough
	6. Sentences and words can measure the reader's level.	3	3	3				
Vocabulary: expressions, work, choice, exaggeration	7. The use of expressions/terms is limited.	3	3	3	18	24	75%	Enough
	8. The words or expressions used do not use a lot of vocabulary.	3	3	3				
Active and passive sentences	9. Using active and passive sentences.	4	3	3	10	12	83,33%	Enough
Format	10. In the form of scientific writing that displays evidence in the form of data or images that are arranged systematically..	4	3	4	11	12	91,67%	Very Valid
Writing method	11. The simplicity and attractiveness of a writing.	4	3	4	11	12	91,67%	Very Valid
Applications and implications	12. Using real-world problems to engage readers.	3	3	4	10	12	83,33%	Enough
Definition and explanation	13. Using; descriptions or examples to facilitate understanding for	4	4	4	12	12	100%	Very Valid

Assessment Aspects	Statement	Validator			Tse	Tsh	Persentase	Validity Category
		I	II	II				
	reader.							
Other styles of devices: narrative, humor, and analogy	14. Using analogies to explain complex ideas.	3	4	4	21	24	87,5%	Very valid
	15. Using narrative to explain the ideas presented.	3	3	4				
Average							**85,42%**	**Very valid**

The coherence assessment aspect shows a percentage of 81.25% with a validity level category of quite valid or can be used but needs minor revision. The coherence aspect assessment shows that the BIP product developed by the researcher is good because the paragraphs presented in the BIP have appropriate, coherent, and logical main ideas (Latifah et al., 2020). The readability assessment aspect shows a percentage of 75% with a validity level category of quite valid or can be used but needs minor revision. The readability assessment aspect shows that the BIP product developed by the researcher is appropriate in terms of font style, font size, and spacing between lines in the writing.

The vocabulary assessment aspect shows a percentage of 75% with a validity level category of quite valid or can be used but needs minor revision. This data shows that the BIP product developed by researchers already contains simple and easy-to-understand vocabulary and contains explanations of foreign words or terms that are less understood both in the contents of the book and in the glossary section. According to (Putri et al., 2020) BIP is made in simple or popular language, so that it is easy for readers to understand.

The assessment aspect of active and passive sentences shows a percentage of 83.33% with a validity level category of quite valid or can be used but needs minor revision. The format assessment aspect shows a percentage of 91.67% with a validity level category of very valid or can be used without revision. The writing method assessment aspect shows a percentage of 91.67% with a validity level category of very valid or can be used without revision.

The application and implication assessment aspect shows a percentage of 83.33% with a validity level category of quite valid or can be used but needs minor revision. The application and implication aspects of the researcher have included research data, namely the morphological and anatomical characterization of the binjai plant and an explanation of the local wisdom of the binjai plant related to the daily lives of the community. BIP usually contains new findings, actual conditions, and daily activities (Putri et al., 2020).

The definition and explanation assessment aspects show a percentage of 100% with a very valid level of validity category or can be used without revision. The assessment aspects of other styles of devices: narrative, humor, and analogy show a percentage of 87.5% with a very valid level of validity category or can be used without revision. The BIP product developed by the researcher already contains examples and narratives to facilitate reader understanding..

The overall results of the validity test by three expert Validators showed an average percentage of 85.42%. Based on the criteria adopted from Akbar (2022), this value has a very valid level of validity or can be used without revision. However, the researcher still made minor revisions according to the Validator's suggestions to improve the BIP product that was developed. Based on previous research conducted by Sintia et al. (2021) showed that the BIP that had been developed with a percentage of 89.68% with a very valid category, theoretically and procedurally the BIP that was developed was very feasible to use.

After conducting the expert review stage, the BIP product will proceed to the individual evaluation stage (one to one evaluation). The individual evaluation (one to one evaluation) at the Tessmer formative evaluation stage was carried out to determine the readability of the BIP product for users. The individual evaluation was carried out on 6 users, consisting of 3 students and 3 members of the general public. The instrument used in this readability test was a questionnaire or survey adapted from Zaini (2018). The results of the BIP readability test were adjusted to the criteria adopted from Sugiyono (2017) to determine the readability category obtained.

Table 4. Readability Test Results

Assessment Aspects	User						Tse	Tsh	Persentace	Readability Category
	I	II	III	IV	V	VI				
1. Every part studied is easy to understand.	4	4	4	4	4	4	24	24	100%	Very Good
2. The entire contents of the complete popular scientific book.	4	4	4	4	4	4	24	24	100%	Very Good
3. Kata-kata yang digunakan mudah dipahami.	3	4	4	4	4	4	23	24	95,83%	Sangat baik
4. Kualitas gambar bagus dan dapat dipahami maksudnya.	4	4	4	4	4	4	24	24	100%	Sangat baik

Assessment Aspects	User						Tse	Tsh	Persentace	Readability Category
	I	II	III	IV	V	VI				
5. Kesalahan ketik atau tata bahasa tidak ditemukan.	3	3	4	3	4	4	21	24	87,5%	Very Good
6. Foto pada cover jelas dan dapat dipahami maksudnya.	3	4	3	4	4	4	22	24	91,67%	Very Good
Average									**95,83%**	**Very Good**

Individual evaluation is useful for assessing or obtaining information about the content elements of the BIP being developed (Rusdi, 2018). The readability test is carried out to determine whether the layout, material, and language can be understood by the reader (Dewi & Arini, 2018). The readability test questionnaire contains an assessment related to the readability of the BIP product being developed, including an assessment of the completeness of the book's contents, each word and part of the book is easy to understand, the quality of the images, and typos in the book. The recapitulation results of the individual evaluation of the BIP product showed an average percentage of 95.83%, based on the criteria adopted from Sugiyono (2017) this value has a very good level of readability. The results of previous research conducted by Putri et al. (2020) showed an individual test percentage of 90.5% with a very good category. Although the results of the individual evaluation showed a very good category, the researcher still made minor revisions according to suggestions from six users to improve the BIP product being developed.

Based on the assessment by six users, the BIP product developed by the researcher is very good to read. The BIP developed by the researcher is packaged in easy-to-understand language and with an attractive design so that it is not boring when read. The BIP developed by the researcher contains interesting information accompanied by other additional information that is not rigid and there is a QR code that can be scanned. According to the community, the addition of this QR code is something new for them and can add a little to their knowledge about technology. This is in line with Latifah et al (2020) who stated that BIP is a simple scientific paper, written in language that is easily understood by the general public at large.

CONCLUSION AND RECOMMENDATION

Based on the research that has been done, the BIP that was developed contains an explanation of the morphology and anatomy of the binjai plant, written in simple language and easy to understand by the reader. The BIP that was developed also contains an explanation of the use of the binjai plant, both leaves, stems, and fruit. In addition, brief information and a QR code that can be scanned are also

included to attract the interest of the reader. The validation results of the BIP that was developed include validity and readability tests, namely a validity test of 85.42% with a very valid category, while the results of the readability test have a readability level of 95.83% with a very good category. Suggestions for further researchers are expected to be able to develop BIP to the stage of small group testing, field testing, to the final stage in EDR research, namely assessment, so that better results can be obtained than this study.

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