

The Practicality of Popular Scientific Books based on the Diversity of Fish Species in Puting River Waters

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Abstract

Teaching materials are needed to assist in the learning process. One of the teaching materials that can be used is in the form of popular scientific books. Popular scientific books developed must be based on local potential to support learning the concept of diversity in animal ecology courses. So the purpose of this development research is to get the results of the practicality of the contents and expectations of the prototype of a popular scientific book with the title "Diversity of Fish Species in Puting River Waters". The BIP development method uses a development research design model from Tessmer which focuses on formative evaluation. The results of the research on the content practicality test obtained an overall percentage average value of 91.67% with very good criteria, while the results of the expected and actual practicality test were seen from the results of the implementation of popular scientific books which obtained an average of 82.41% with very good criteria, and the results of student responses to popular scientific books obtained an average of 91.97% with the criteria of strongly agreeing. This proves that a popular scientific book with the title "Diversity of Fish Species in Puting River Waters" is very practical to use to explore students' critical thinking skills in learning Animal Ecology.

Abstrak

Bahan ajar diperlukan untuk membantu dalam proses pembelajaran. Salah satu bahan ajar yang dapat digunakan yaitu berbentuk buku ilmiah populer. Buku ilmiah populer yang dikembangkan harus berbasis potensi lokal untuk menunjang pembelajaran konsep keanekaragaman pada mata kuliah ekologi hewan. Maka tujuan penelitian pengembangan ini adalah untuk mendapatkan hasil kepraktisan isi dan harapan prototipe buku ilmiah populer dengan judul "Keanekaragaman Jenis Ikan di Perairan Sungai Puting". Metode pengembangan BIP menggunakan model desain penelitian pengembangan dari Tessmer yang berfokus pada evaluasi formatif. Hasil penelitian pada uji kepraktisan isi memperoleh nilai rata-rata persentase keseluruhan sebesar 91,67% dengan kriteria sangat baik, sedangkan hasil uji kepraktisan harapan dan aktual dilihat dari hasil uji keterlaksanaan buku ilmiah populer yang memperoleh rata-rata 82,41% dengan kriteria sangat baik dan hasil respon mahasiswa terhadap buku ilmiah populer memperoleh rata-rata 91,97% dengan kriteria sangat setuju. Hal tersebut membuktikan bahwa buku ilmiah populer dengan judul "Keanekaragaman Jenis Ikan di Perairan Sungai Puting" sangat praktis digunakan untuk menggali keterampilan berpikir kritis mahasiswa dalam pembelajaran Ekologi Hewan.

A. Introduction

South Kalimantan Province is one of the areas that have a wealth of wetlands that is very wide and diverse so that it has the potential to be one of the areas that can be excelled. Septiyan et al. (2019) explained that South Kalimantan Province has freshwater in the form of freshwater swamps.

South Kalimantan is rich in aquatic flora and fauna, especially fresh water, one of which is fish in the waters of the Puting River. Puting River is a river located in Candi Laras Utara District, Tapin Regency, South Kalimantan Province, Indonesia (Kusumastuti, 2018). Puting River as a river in general has the potential for diversity of flora and fauna; this is due to the availability of food resources and a place for various kinds of living things, one of which is fish.

Fish is one of the living things that live in the aquatic environment in the sea, rivers, ponds, ponds, reservoirs, and so on. One of the major roles of fish in human life is as food, namely a source of essential nutrients (Djunaidah, 2017). Fish can also be used as a source of learning, where one of the lessons related to the surrounding environment is the diversity of fish species discussed in the animal ecology course.

Animal Ecology course is a course that teaches the focus of studies on animals, so it is defined as a course that studies the interaction relationship between animals and their environment. Teaching materials that can contain material with examples sourced from the surrounding environment need to be developed by Irianti & Mahrudin (2021).

Teaching materials are learning tools that are made systematically and coherently so that students can achieve the desired competencies (Hernawan, 2012). Thus, it can be concluded that teaching materials are information, tools and texts needed by teaching staff to plan and study implementation in learning, example: Popular Scientific Books (BIP).

A popular scientific book is one of the written works that is made based on the principles of the scientific method, but is described in simple sentences and displayed in an attractive way, making it easier for readers to understand a scientific work that is usually considered difficult to understand. According to Setiawan (2017) popular scientific books are one type of book that contains knowledge and presents facts and is written in easy and interesting language. Popular scientific writing uses simple, concise, dense language, the text must be appropriate to the level of education, the ideas conveyed must be sequentially, the sentences must lead to understanding, and the sentences used must be clear and convincing (Rokedzon & Baram-Tsabari, 2017; Trim, 2014).

Based on the description above, BIP is a book written from the results of scientific studies, but is not bound by the rules of scientific writing so that the presentation is interesting and easily understood by the general public (using popular language). With several advantages possessed by popular scientific books, one of which is arranged in an attractive language style, so that it can attract students' reading interest. Interest in reading facilitates the process of understanding and delivering messages (Latifah et al., 2018). Teaching materials need to be developed to support materials based on the surrounding or local environment. Therefore, researchers are interested in developing local content-based teaching materials in the form of popular scientific books.

Several studies on the development of teaching materials based on local potential have been studied by Nurlita et al. (2021) regarding the practicality of popular scientific books on ethnobotany which are stated to be practical to use as enrichment for Low Plant Botanical Material. Fajeriadi et al. (2019) and Astuti et al. (2021) explained that popular scientific books developed were practical for use in high school learning.

Based on the description above, it can be seen that there are still quite wide opportunities in developing teaching materials, one of which is popular scientific books. Utami (2017) reports the results of BIP validation by material experts in a good category, validation results by media experts in a very good category, trials conducted by teachers in a very good category, and small group trials also have a very good category. Irianti & Mahrudin (2021), stated that the results of research on BIP teaching materials for the diversity of Fish Types that were compiled obtained readability scores in the very good category, student responses in the category of strongly agree and implementation in the very good category, so that the developed BIP was practically used.

B. Material and Methods

This type of research is development research. This development research focuses on Formative Evaluation by Tessmer (1998). This development research begins with carrying out preliminary research, namely making an initial product design which is then developed, namely a popular scientific book with the title "Diversity of Fish Species in Puting River Waters". The practicality data of the contents of popular scientific books is obtained from the results of the One to one test, while for practicality expectations are obtained from the Small group test and the actual practicality

test is obtained from the Field test so that the data obtained are:

- 1) The practicality test of the contents can be seen from the student readability questionnaire sheet. The results of the practicality test of student content are then calculated using the formula below.

$$P = \frac{A}{B} \times 100\%$$

Information:

P : Percentage

A : Total score obtained for each aspect

B : Total score

Table 1 Percentage of Readability Test

Percentage	Criteria
80,01 < x ≤ 100%	Very good
60,01 < x ≤ 80%	Good
40,01 < x ≤ 60%	Currently
20,01 < x ≤ 40%	Not good
0 < x ≤ 20%	Not very good

(Source: Modification of Fatmawati, 2014)

- 2) The practicality test of expectations and actual can be seen through a questionnaire on the implementation of expectations and actual use of popular scientific books. The results of the implementation test of the use of student popular scientific books are calculated by the formula below.

$$\text{Student Score} = \frac{\text{Total score obtained}}{\text{Maximum score}} \times 100\%$$

Table 2 Usage Implementation Category

Percentage	Criteria
80,01 < x ≤ 100%	Very good
60,01 < x ≤ 80%	Good
40,01 < x ≤ 60%	Currently
20,01 < x ≤ 40%	Not good
0 < x ≤ 20%	Not very good

(Modification of fatmawati, 2014)

- 3) Student responses to the use of popular scientific books, namely using the instrument used, namely the expected and actual practicality test sheet in the form of student response questionnaires. The results of student responses to the use of popular scientific books are calculated using the formula below.

$$\text{Student responses percentage} = \frac{A}{B} \times 100\%$$

Information:

A = Proportion of students who choose

B = Total ideal score

Table 3 Percentage of Student Responses

Percentage	Statement/ Practicality Level
80,01 < x ≤ 100%	SS/Strongly agree
60,01 < x ≤ 80%	S/Agree
40,01 < x ≤ 60%	KS/Disagree
20,01 < x ≤ 40%	TS/Disagree

C. Results and Discussion

1. Student Readability

The practicality of the contents of popular scientific books on the diversity of fish species in the Puting River is obtained based on the results of the readability test of three students as shown in Table 4 below.

Based on the data presented in Table 4, it can be seen that the results of the readability test of popular scientific books with the title "Diversity of Fish Species in Puting River Waters" obtained an average result of 91.67 and belonged to the very good category. So it can be seen that the results of the content practicality test conducted by three students indicate that the developed popular scientific books can be further tested in order to improve students' critical thinking skills in learning diversity.

The results of the student legibility test at the stage (one to one) of popular scientific books on fish species diversity aims to assess the attractiveness aspect in presenting popular scientific books using 13 indicators that can be seen from the results of the presentation of popular scientific books with the title "Diversity of Fish Species in River Waters Nipples". One indicator that has a high value is that the images presented are clear or not blurry with an average category of 100%, thus attracting the attention of readers to continue studying it. This is in line with Khairoh & Nurhayati (2014) which states that it will be easier for readers to learn a book with interesting and entertaining pictures than reading a verbal book; this is because the display of colors or images can facilitate understanding and strengthen memory about a material. Several suggestions from three students who took the Animal Ecology course were obtained from this stage, such as multiplying pictures, paying attention to vocabulary usage, and designing the BIP as attractive as possible. Hutama (2016) explains that the purpose of the individual test is to find out the attractiveness of the teaching material product by identifying and reducing errors in the prepared teaching material product.

Based on the results described above for the individual test in terms of readability, interactiveness, and ease of use, it can be seen that students strongly agree that the popular scientific books compiled are used in learning Animal

Ecology. This can be seen from the test results which obtained very good criteria. These results indicate that the BIP is very interesting and understandable and easy to apply the material in

everyday life by readers. This individual test is very important to do so that the BIP that has been developed can be in accordance with the conditions of students or readers who will use it in learning.

Table 4 Student Readability Test Results

No	Validated Indicators/Aspects	Student			Average
		I	II	III	
1	Easy to understand text	4	3	4	91,67
2	Image is clear or not blurry	4	4	4	100,00
3	There is a description in the picture	3	4	4	91,67
4	Interesting images presented	4	3	4	91,67
5	The images presented are in accordance with the material	3	4	4	91,67
6	Explaining a concept using illustrations of problems related to everyday life	4	3	3	83,33
7	Using everyday life examples	3	4	4	91,67
8	Encourage discussion with other friends	4	3	4	91,67
9	Related to biology	4	4	4	100,00
9	The material is coherent	3	4	3	83,33
10	There are no sentences that have a double meaning	4	4	4	100,00
11	The symbols or symbols in this popular science book are easy to understand	3	3	4	83,33
12	The terms in this popular science book are easy to understand	3	4	4	91,67
13	There is a description in the picture	3	4	4	91,67
Overall Average (%)					91,67
Criteria					Very good

2. Implementation of the Use of Popular Scientific Books

The implementation of the use of popular scientific books is one of the data calculation methods used to measure the practicality of the expectations and actual BIP entitled "Diversity of Fish Species in Puting River Waters". According to Hidayati (2016) the practicality test can be seen from the implementation in the classroom, namely

to observe the convenience of students in implementing teaching materials made using assessment instruments. Based on this, the results of the BIP implementation data were obtained through a small test (Small Group) conducted by 3 students and a large test (Field test) by 10 undergraduate students of ULM Biology Education, data on the implementation of student expectations and actual can be seen in Table 5.

Table 5 Data on the Implementation of the Use of Popular Scientific Books

No	Statement	Execution	
		Hope	Current
1	Students read the front (table of contents, instructions and explanation of contents)	100	80
2	Students read the introductory information	66,67	70
3	Students read descriptions of general information	66,67	70
4	Students look at pictures and descriptions in popular scientific books	66,67	80
5	Students look at the writing on the colored boxes	66,67	80
6	Students read facts about the concept of diversity	66,67	80
7	Students reading the glossary	100	100
8	Students use popular scientific books when making observations	100	90
9	Students use popular scientific books when doing data analysis	100	100
Percentage (%)		81,48	83,33
Overall Average		82,41	
Criteria		Very good	

Based on the results obtained from the actual and expected implementation test by students on popular scientific books, the average score was 82.41% where the results were included in the very good criteria. These results illustrate that the BIP developed can be said to be practical for students to use in exploring critical thinking skills so that they

are easily understood and learned by students in the Animal Ecology course.

The results of very good implementation show that the scientific books used have been running well, this can be seen from several aspects that have been implemented, such as students reading the front of the book, students using BIP

during observations as well as when analyzing and even reading the glossary. Apart from all these aspects, students have followed the activities well. According to Dharmono et al. (2019), teaching materials that are written simply and stylishly, concisely, densely, and rely on thought can attract reading interest, are not boring, easy to learn anytime and anywhere, and make it easier for a wide audience to learn them.

3. Student Response to Popular Science Books

Student responses to popular scientific books that were developed were obtained through a small test stage conducted by three students (expected practicality) and a large group test conducted by 10 undergraduate students of Biology Education ULM (actual practicality). The results of student responses can be seen in table 6.

The practicality of a popular scientific book entitled "Diversity of Fish Species in Puting River Waters" was obtained from the results of student responses to the expected and actual practicality. Based on the results of student responses to the use of BIP, it is obtained an overall average value of 91.97% so that the criteria for strongly agree. These results indicate that students respond positively when using the BIP entitled "Diversity of Fish

Species in Putting River Waters". The results of these student responses provide an illustration that the BIP that has been developed is practical to use.

The positive response by undergraduate students of Biology Education at Lambung Mangkurat University showed that the use of BIP "Diversity of Fish Species in Sungai Puting Waters" helped them in learning. In addition, the BIP that has been developed is also equipped with various illustrations, various images that match the material so that it can grow and increase their interest in learning a new material. This is in line with Dalman (2014) which explains that a BIP should have a popular language, not tied to standard scientific writing and an attractive display of images so that the reader's interest in reading the contents of the material in the BIP is made. Another reason is that the developed BIP has taken into account various aspects, one of which is by adjusting an attractive presentation and the appearance of material that is easily understood by readers. This is in accordance with Barnawi & Arifin (2015) which explains that the presentation, appearance, and depth of material in a book, one of which is BIP, must be in accordance with the level of education and follow the development of technology and science.

Table 6 Student Responses to Popular Science Books

No	Statement	Practicality	
		Hope	Current
1	This BIP motivates me to study.	93,33	90,00
2	I can learn actively and independently with this BIP.	93,33	90,00
3	The material presented can be understood easily.	100,00	94,00
4	Beep is very interesting and not boring when used.	93,33	90,00
5	If the use of BIP is carried out like this, I can remember the concepts from the lesson material easily and for longer	86,67	92,00
6	The use of BIP can help solve problems in everyday life related to learning topics	93,33	94,00
7	The use of this BIP has broadened my horizons	86,67	96,00
8	I can understand the material with the help of good quality pictures	86,67	92,00
9	I can study according to the needs of independent study	86,67	90,00
10	Learning by using BIP can help me develop critical thinking skills.	93,33	98,00
Percentage (%)		91,33	92,60
Overall Average		91,97	
Criteria		Strongly Agree	

Based on the results of the readability, feasibility, and student responses to popular scientific books developed, it is said to be practical for students to use if they have advantages such as being able to provide motivation to learn, interesting book content, and easy to understand material. So that it can make it easier for students to apply it and understand the material being studied. The purpose of using popular scientific books developed is to improve critical thinking skills with indicators obtained from Facione, namely the core of critical thinking is part of cognitive skills which

includes interpretation (interpretation), analysis (analysis), evaluation (evaluation), inference (inference), explanation (explanation), and self-regulation (Susilowati et al., 2017).

Students think that studying the characteristics of fish using popular scientific books containing descriptions and pictures can make it easier for students to learn. Fitriansyah et al. (2018) explained that scientific papers should be easy to use in order to motivate students not to be lazy, not easily bored, and more enthusiastic in learning.

Based on the description above, the results of

the implementation of practical expectations are in accordance with the reality on the ground. Therefore, it is very important to test the expected and actual practicality of the development product before using the product in order to measure its effectiveness. The advantages of popular scientific books that have been developed make this teaching material very practical because the material developed contains the Diversity of Fish Species in Puting River Waters which can be used as environment-based learning. In addition, the developed scientific books are arranged in such a way as to make it easier for students to understand and study the books they have made.

D. Conclusion

Based on the data obtained, it can be concluded that the results of "the practicality of popular scientific books on the diversity of Fish Species in Puting River Waters" were obtained from three tests, namely the practicality test of the content seen from the student readability test with an overall percentage average value of 91.67% with the following criteria: very good, while the results of the practicality test of expectations and actual are seen from the results of the implementation test of popular scientific books which get an average of 82.41% with very good criteria and the results of student responses to popular scientific books get an average of 91.97% with very good criteria. agree. Based on the description above, it can be concluded that the BIP developed is easy and practical to use to explore students' critical thinking skills in understanding Animal Ecology material.

Suggestion:

The research conducted is still limited to practicality tests, so to obtain information on the feasibility of BIP it is necessary to proceed to the effectiveness test phase obtained from student users.

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