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Practicality of popular scientific book on Odonata

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Abstract

The Popular Scientific Book (PSB) on Odonata that inhabits the Tabanio Coastal Forest, Tanah Laut Regency has been completed, but its practicality has yet to be determined. The aim of the research was to determine the practicality of the PSB. The determining parameters were readability, applicability, and student responses which in this case are undergraduate students of the Biology Education Study Program. Readability was tested by three students using the one-to-one method. The implementation was tested by five observers through a small group assessment (on five students using the PSB) to get the expected implementation value and field test assessment (on 10 students) so that the actual implementation was obtained. Student responses were obtained from small groups (five students) and field tests (10 students). The result is that the readability of the book is categorized as Very Good, the implementation of expectations and actual implementation is categorized as Very Good, as well as the expected and actual responses from students Strongly Agree. With these categories, this PSB on Odonata is stated to be practical to use.

Abstrak

Buku Ilmiah Populer (BIP) tentang Odonata yang menghuni Hutan Pantai Tabanio, Kabupaten Tanah Laut telah selesai, namun belum ditentukan kepraktisannya. Tujuan dari penelitian ini adalah untuk mengetahui kepraktisan BIP. Parameter yang menentukan adalah keterbacaan, penerapan, dan tanggapan mahasiswa yang dalam hal ini adalah mahasiswa S1 Program Studi Pendidikan Biologi. Keterbacaan diuji oleh tiga mahasiswa dengan menggunakan metode *one-to-one*. Implementasi diuji oleh lima orang pengamat melalui penilaian kelompok kecil (pada lima mahasiswa menggunakan BIP) untuk mendapatkan nilai implementasi yang diharapkan dan penilaian uji lapangan (pada 10 mahasiswa) sehingga diperoleh implementasi yang sebenarnya. Respon mahasiswa diperoleh dari kelompok kecil (lima mahasiswa) dan uji lapangan (10 mahasiswa). Hasilnya adalah keterbacaan buku dikategorikan Sangat Baik, pelaksanaan harapan dan pelaksanaan aktual dikategorikan Sangat Baik, serta respon yang diharapkan dan aktual dari mahasiswa Sangat Setuju. Dengan kategori tersebut, BIP di Odonata ini dinyatakan praktis untuk digunakan.

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A. Introduction

Odonata is one of the environmental components known throughout the world to be the inspiration for a human masterpiece called the helicopter. The use of Odonata as inspiration material is an unforgettable history and of course it shouldn't end here either. There are still many things that can be revealed from this animal.

These predatory insects that have various attractive patterns and beautiful colors are included in the wetland insects (Soendjoto, 2016a; Uboni et al., 2021) or the aquatic insects (Carvalho-Soares et al., 2022). The egg, larvae, and nymph phases develop around water, while the adult phase is active in terrestrial or air. As a top predator, Odonata plays an important role as a bioindicator of various hydroecosystems, such as water cleanliness and river or water health (Lubis et al., 2019; Mariani-Ríos et al., 2022; Porta et al., 2023). Its abundance in Kalimantan Selatan Province makes this animal a local potential for study (Ansari et al., 2016; Soendjoto et al., 2016).

Wetland is a flagship study at Universitas Lambung Mangkurat (ULM), one of the state universities in the province. It is natural for Odonata to be the subject of study in the Invertebrate Zoology course in the Faculty of Teacher Training and Education Sciences, ULM or the Introductory Wetland Environment course in all faculties of ULM. Especially for the Invertebrate Zoology course, study material has been packaged in a popular scientific book (PSB). PSB is then used to improve critical thinking skills, processes and the ability to understand concepts, apply, synthesize, and evaluate information. The PSB format was chosen because it can be applied in simple language and is not rigid, so that it is relatively easy for readers to understand. Unfortunately, the practicality of PSB regarding Odonata has not been tested.

This study aims to determine the practicality of PSB. This practicality is useful for measuring the extent to which PSB can be used and revising anything that is inappropriate, bad or incorrect so that PSB can be categorized as having quality.

B. Material and Method

1. Research Locations

There are two research locations. The first location is the Tabanio Coastal Forest which is located in Tabanio Village, Takisung District, Tanah Laut Regency. This wetland forests and sandy soils on the west coast of South Kalimantan (Soendjoto, 2016b) were used to obtain data related to the morphology, behavior and ecology of Odonata species. The next location is the Biology Education Study Program, Faculty of Teacher Training and Education Sciences, ULM which is located in the center of Banjarmasin City. Here PSB's practicality of Odonata is determined by testing the readability, applicability, and response of the subject. The distance between the two research locations is about 90 km. Accessibility is good. The road is paved. The location can be reached by 2-wheeled or 4-wheeled vehicles in about 2.5 hours.

2. Data Collecting

During a random survey in the coastal forest, nine species of dragonfly (casar) and three species of damselfly (carum) were found. The dragonflies are Wandering Glider (capung kembara, *Pantala flavescens* Fabricius), Yellow Striped Flutterer (capung-sambar bercak-kuning *Rhyothemis phyllis* Sulzer), Slender Skimmer (capung-sambar hijau, *Orthetrum sabina* Drury), Blue Dasher (capung-sambar metalik *Brachydiplax chalybea* Brauer), Ditch Jewel (capung-jemur oranye, *Brachytemis contaminata* Fabricius), Ground Skimmer (capung-tengger biru, *Diplacodes trivialis* Rambur), Grasshawk Dragonfly (capung sayap-merah, *Neurothemis fluctuans* Fabricius), Rufous Marsh Glider (capung-merah punggung-metalik, *Rhodothemis rufa* Rambur), Red Glider (capung-luncur perut-merah, *Tramea transmarina* Brauer), while the damselflies are Pinhead Wisp (capung-jarum centil, *Agronemis femina* Brauer), Common Bluetail (capung-jarum sawah, *Ischnura senegalensis* Rambur), dan Blue Riverdamsel (capung-jarum kepala-kecil, *Pseudagrion microcephalum* Rambur). Classification, ecology, behavior, and benefits of Odonata in general and specifically for these species are contained in the PSB whose cover page and contents are presented in Figure 1.

The readability of PSB, the implementation of using PSB, and students' responses to PSB were then tested. The complete method is as follows.

1) Readability was tested one-to-one by 3 students with an instrument in the form of a questionnaire containing 13 indicators. The score assigned to each indicator is 1 (if very illegible), 2 (unreadable), 3 (readable), or 4 (very readable).
2) Implementation is tested by observers, assessors of the implementation of activities that reflect critical thinking (according to PSB) by the subject. In a small group (5 students), 1 observer assesses 1 subject and the result of the assessment is the expected implementation. In the field test (10 students), 1 observer assessed 2 students. The result is actual

implementation. The test instrument, both for small groups and for field tests, is a questionnaire with 9 statements. The score that can be given for each statement is 0 (if not implemented) or 1 (implemented).

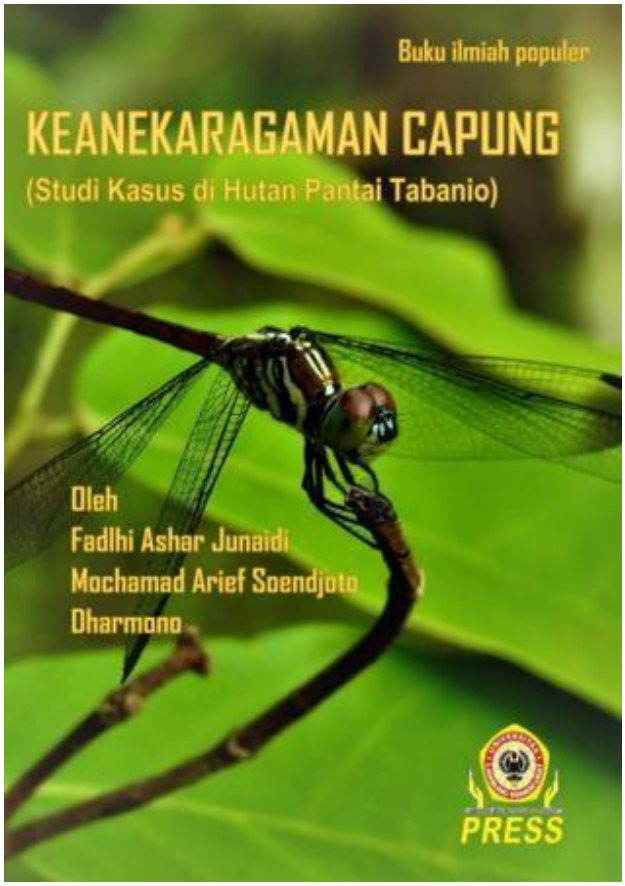

Figure 1 PSB cover page (in Indonesia)

3) Responses to PSB were tested by 5 students (small group) or by 10 students (field test). The test in the small group produces the expected response and in the field test produces the actual response. The instrument for both is a questionnaire with 10 statements. The score for each statement is 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), or 5 (strongly agree).

In the readability test, the average value for each indicator is calculated by the Formula 1.

$$P = \frac{A}{B}\ x\ 100\% \quad \text{..... Formula 1}$$

In this case, P = the value of each indicator, A = the number of scores obtained by each indicator, B = the maximum number of scores expected for each indicator.

The readability value is the average value of all indicators which are further categorized qualitatively as in Table 1.

Table 1 Range of values and qualitative categories

Value Range (%)	Qualitative Category	
	Readability/ Implementation	Student Response
80,00 – 100,00	Very Good	Strongly Agree
60,00 – < 80,00	Good	Agree
40,00 – < 60,00	Moderate	Disagree
20,00 – < 40,00	Not Good	Don't Agree
0 – < 20,00	Very Not Good	Strongly Disagree

(Source: Modified by Anwar et al., 2022)

In the implementation test, the mean value of each statement is calculated by Formula 1. The result of the implementation test is the average value of all statements and their categorization is combined and matched with Table 1. Such calculations are also applied to obtain student responses.

C. Results and Discussion

1. Readability of PSB by Students

The mean value of the PSB readability test on Odonata is 94.23% and qualitatively it is categorized as Very Good (Table 2). This category indicates the PSB readability is high, although some aspects (shown by the indicator value which is not 100%) must be revised. The aspects that must be improved are related to the presentation of attractive images and of course in accordance with the material, the use of illustrations, the use of examples, and all aspects (whether in the form of words, sentences, or pictures) that trigger or spur enthusiasm for discussion.

A person reads a book and understands its content more easily if the book is accompanied by attractive and entertaining pictures and colors. In the PSB about Odonata, a presentation in the form of a picture or photo is needed because a clear and exact photo of the original makes it easier for the subject to compare and finally identify the species. From the photo, the mind can capture the perception of the shape, color, and location of the Odonata organ directly. Images and color displays facilitate understanding and strengthen one's memory of a material (Khairoh et al., 2014), as well as foster interest, strengthen memory, and improve critical thinking skills (Riefani et al., 2020). Pictures are one form of illustration in books or writings (Anwar et al., 2022) that make it easier for someone to understand learning and shorten the teacher's time to explain the material (Hakim et al., 2019), and can clarify messages or information and make materials interesting, motivating, communicative, and easy-to-understand learning (Pratama & Yasa, 2020). Color is a visual communication tool that can affect a person's mood

and even decision making (Listya, 2018). Colors applied in games can increase one's creativity, in this case children (Aisyah, 2017).

On the other hand, books with verbal statements are still needed. Verbal statements trigger the subject to think or imagine. Students can develop their critical thinking when they find something different from life experiences or real things that they experience in everyday life. Students can also imagine when finding a verbal statement that is new or has never been stored in their mind before.

Table 2 PSB readability test values by students

No.	Indicators	Student			Mean Value
		I	II	III	(%)
1	Easy to understand text	4	4	4	100,00
2	Image is clear or not blurry	4	4	4	100,00
3	There is a description on the picture	4	4	4	100,00
4	Interesting images presented	3	3	4	83,33
5	The images presented are in accordance with the material	3	4	3	83,33
6	Explain a concept using illustrations of problems related to everyday life	4	3	3	83,33
7	Using examples from everyday life	3	4	3	83,33
8	Encourage discussion with other friends	4	3	4	91,67
9	Related to biological material	4	4	4	100,00
10	The material is coherent	4	4	4	100,00
11	There are no double meaning sentences	4	4	4	100,00
12	The symbol or symbol in the beep is easy to understand	4	4	4	100,00
13	The terms in PSB are easy to understand	4	4	4	100,00
	Readability value (%)				**94,23**
	Qualitative category				**Very Good**

A person's thinking ability to express ideas or opinions in a systematic, effective, efficient, and communicative manner, both orally and in writing and respond to all things verbal is a verbal ability (Wahyuddin, 2014). If a person's verbal ability is higher, then his critical thinking skills are better (Wulandari & Nurhayati, 2018).

Indeed the subject can be misinterpreted or confused, if the book features a lot of verbal statements. Misinterpretations or confusion can be reduced through the preparation of sentences that follow linguistic rules (eg related to sentence structure, spelling, absorption of foreign words), reducing the use of unnecessary words, and using words consistently. The linguistic rules of a particular language must be understood so that the meaning of something formed or compiled by that language is in accordance with its original meaning (Hamzah, 2015). Linguistic rules help produce good and complex interpretations and minimize haphazard interpretations (Mutakin, 2016).

Color plays an important role in the world of sciences (as in Handayani & Awaliyah, 2016; Kurniastuti et al., 2022; Nurhayati, 2018; Prasthio et al., 2022; Sulistyawati, 2018). Even in the Odonata world, color is an important part of survival, because it functions for intraspecific communication, signals during mate selection, species recognition, predator avoidance, and physiological adaptation to abiotic conditions (Guillermo-Ferreira et al., 2015; Suárez-Tovar et al., 2022). Therefore, the misperception of colors that have gradations should be avoided or reduced. One effort to avoid this is the use of HSV (Hue Saturation Value). HSV is the saturation value of the basic red green blue (RGB or red green blue) which represents a certain gradation or color space.

2. Implementation of the use of PSB

In this implementation, the activities that become the content of PSB and are carried out as learning activities by the students are related to critical thinking skills. This ability is based on Facione (2015), namely interpretation, analysis, evaluation, inference, explanation, and self-regulation.

The overall implementation value tends to be positive or increases from 88.89% for expected implementation to 93.33% for actual implementation (Table 3). These two values are categorized as Very Good and show the consistency between the scores produced by a few students and those produced by many students.

Five of the nine statements in the implementation test show a tendency that varies when the expected implementation value and the actual implementation value are compared. The explanation is as follows.

Three aspects, namely reading the introductory information, observing the writing in the colored boxes, and reading the glossary are considered perfect because the actual implementation value reaches 100%. This

condition indicates that in the actual implementation test, all students in this field test read or pay close attention to the information before they carry out the activity.

They also always pay attention to the glossary because it helps them to answer or find the meaning of words or phrases that they are still unsure of, do not know, or do not know. A glossary is a collection of words and phrases arranged alphabetically and accompanied by explanations (Setiawan, 2021) in certain writings, such as books or reports. Its function is to help readers understand various terms in the book, enrich vocabulary, and increase knowledge related to those terms (Sampoerna University, 2022).

Table 3 The implementation value of the use of PSB

No	Statements	Implementation (%)	
		Expected	Actual
1	Students read the opening part of this PSB (table of contents as well as instructions and explanations of contents)	70,00	80,00
2	Students read the introductory information	90,00	100,00
3	Students read descriptions of general information	70,00	60,00
4	Students look at the pictures along with the information on the PSB	100,00	100,00
5	Students look at the writing on the colored boxes	90,00	100,00
6	Students read facts about the concept of diversity	100,00	100,00
7	Student reading the glossary	80,00	100,00
8	Students use PSB at the time of observation	100,00	100,00
9	Students use PSB when analyzing data	100,00	100,00
	Implementation value (%)	**88,89**	**93,33**
	Qualitative category	**Very Agree**	**Very Agree**

The next aspect, namely reading the opening part of the PSB also tends to be positive, but the value does not reach 100%. Why is that? Only a few students really think that the opening part is not important and really don't need to read it. Another possibility is that the observer only assesses the subject at the beginning of the activity and does not judge in the middle of the activity. The observer did not notice that the subject skipped the opening for a while. The subject turned out to read the opening part after carrying out the activity.

One aspect of the rest (in this case reading the description of general information) tends to be negative, i.e. from 70% on the implementation of expectations to 60% on the actual implementation. This condition is thought to be the result of an increasing number of students who think that (1) general information descriptions are not important or (2) general information descriptions are conveyed in lengthy, boring, or unfocused manner. These two conditions make more and more students who in the end do not read the description.

Apart from the implementation conditions in the PSB as described above, the information presented in certain sections of the book is important and should be considered. Reading and understanding the information indicates that the reader or subject is trying to act carefully and according to procedures. Reading habits can increase vocabulary, increase insight and knowledge, train thinking and analysis skills, increase imagination and focus, unlock creativity, prevent cognitive decline, improve memory quality, stimulate mentality, reduce stress, improve social relationships and empathy, and finally make people feel better. many people are successful (Saleh, 2014; Shofaussamawati, 2014), although this habit is not attractive to some people. The dominant factors that influence interest in reading are a conducive social environment, curiosity, thirst for information, the principle of life that reading is a spiritual need, and an adequate physical environment (Anugra et al., 2013). Things related to socio-culture include habits from an early age, family and environmental conditions, education, and government support (Ulla et al., 2020).

3. Student Response to PSB

Student responses to PSB tend to be positive, because it increases quantitatively although the increase is small, namely 96.6% for the expected response (which is formed by a few students) and 97.2% for the actual response (which is formed by many students) (Table 4). The response was qualitatively steady; both the response of expectations and the actual response of students to the PSB regarding Odonata Strongly Agree.

Based on the increase or decrease in the value of the expected response to the actual response and the value of both responses that neither reaches 100%, nine statements need to be considered by the compilers of the PSB to be used as revision material. There are four important

aspects in these nine statements.

The first aspect is motivation and activeness and independence in learning. After reading the PSB, the subject's motivation to study or even explore the material should increase. Motivation is a person's strength or determination, which comes from oneself (intrinsic) and/or outside himself (extrinsic) to want to carry out an activity (Suharni & Purwanti, 2018). Learning motivation plays an important role in predicting learning progress (Muhammad, 2016) or a person's learning outcomes (Andriani & Rasto, 2019). Learning activity and independence are positively and significantly related to learning outcomes (Setyawati & Estiastuti, 2017).

The second aspect is the attractiveness of PSB. The PSB is arranged as attractively as possible from various aspects, such as the material (order, coherence, completeness), layout (balance of letterforms, layout of writing, and location of images on the page), appearance (image focus, color brightness), and other presentations (elements sound if any). According to Nurseto (2011), the development of learning media should meet the VISUALS principle (visible, interesting, simple, useful, accurate, legitimate).

Table 4 Student responses to PSB

No.	Statements	Response (%)	
		Expected	Actual
1	I am motivated to learn from this PSB.	96,00	96,00
2	I can learn actively and independently with this PSB.	96,00	96,00
3	I can understand the material presented easily.	100,00	98,00
4	PSB is very interesting and not boring.	100,00	96,00
5	I can remember easily and long duration of lesson concepts, if PSB is implemented.	92,00	96,00
6	PSB can help solve problems in everyday life related to learning topics	100,00	98,00
7	This PSB helped broaden my horizons.	92,00	94,00
8	I can understand the material with the help of good quality pictures.	92,00	100,00
9	I can study according to the needs of self-study.	92,00	98,00
10	Learning by using PSB helps me develop my critical thinking skills.	100,00	100,00
	Student response (%)	**96,00**	**97,20**
	Qualitative category	**Very Agree**	**Very Agree**

The third aspect is presentation. This aspect certainly cannot be separated from the attractiveness. Both need to be balanced so that the material is easy to understand and the concepts can be remembered for a long time.

The last aspect relates to the benefits of PSB. PSB is generally presented in simple language and is not as serious as the language in scientific books. The material is often not taught before or not taught formally. Matter leads to enrichment. It is normal for PSB to be useful for broadening horizons and meeting the needs of the subject for independent study and solving everyday problems. Of course, the authors have to consider these things.

It is not easy to find a solution to a problem, but PSB compilers still have the freedom to find alternative solutions and implement some or all of them with a sense of responsibility. To find a solution, the compiler can interpret independently what the subject wants or needs. Second, the author asks the subject to provide input on the solution, either orally or in writing through the checklist included in each instrument or questionnaire.

D. Conclusion

Overall, the PSB on Odonata is stated to be practical to use, based on 1) the results of the readability test which are categorized as Very Good, 2) the results of the implementation test which are not only steady but also categorized as Very Good and 3) student responses which are steady and also categorized as Strongly Agree. Inputs are still needed, before the effectiveness of PSB regarding Odonata is tested. The number of students as subjects or examiners should also be increased. Effective test results make PSB feasible as learning material or enrichment in Invertebrate Zoology material.

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