



Validation and Development of the Guidebook of *Barambai Kolam Kanan* Dragonflies Species to Increase Science Process Skills

Mariza Uthami

Magister of Biology Education, University of Lambung Mangkurat, Banjarmasin, South Kalimantan, Indonesia.
(email: marizauthami@gmail.com)

Atiek Winarti

Chemistry Education Study Program, University of Lambung Mangkurat, Banjarmasin, South Kalimantan, Indonesia
(email: atiek_winarti@ulm.ac.id; orchid: 0000-0003-098909924)

Danang Biyatmoko

Animal Science Study Program, Universitas of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia
(email: danangbiyatmoko@ulm.ac.id; orchid: 0000-0002-4377-3105)

Ihsan Noor

Mining Engineering Study Program, Universitas of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia
(email: ihsan.noor@ulm.ac.id; orchid: 0000-0002-6067-0781)

Abstract. The biodiversity and diverse habitat of dragonflies in Kalimantan have an enormous potential that can be identified in various fields, one of which is the field of education. Utilizing local potential as teaching materials, one of which is the Guidebook, is considered capable of supporting learning. Skills are trained in learning activities, including science process skills. This study aims to describe the Identification Handbook's validity, practicality, and effectiveness. The stages of development conducted are self-evaluation, expert test by three lecturers of Master of Biology Education at Hull Mangkurat University, individual trial of three students, small group test of five students, and significant group test of twenty undergraduate Biology Education students who have passed the Invertebrate Zoology course. The research results of the Dragonfly Identification Guidebook are the validity of the Dragonfly Identification Guidebook score of 3.44 with a very decent category and the effectiveness of the overall N-Gain average of 0.6 with a medium category that can be implemented in learning.

Keywords. Guidebook, Dragonflies, Science Process Skills

1. Introduction

Dragonflies are insects that belong to the Arthropoda phylum. The number of dragonfly species in Indonesia has been identified as 1,287 species (Widjaja et al., 2014). *Barambai Kolam Kanan* Village is one of the villages in Barito Kuala Regency, South Kalimantan Province. This village's ecosystems include rice field ecosystems, rubber forest ecosystems, artificial irrigation ecosystems with brownish water, and oil palm tree plantation ecosystems. Based on preliminary research, it was concluded that nineteen species of dragonflies from two suborders, namely Anisoptera and Zygoptera, were identified. Nineteen species of dragonflies occupy various habitats in water areas, settlements, rice fields, rivers, and artificial irrigation (Widjaja et al., 2014).

The diversity of fauna species, especially dragonflies, and their varied habitats are potential phenomena that can be utilized. Utilizing this potential is one of them in the field of education.

This potential can be raised as a source of learning, and the results of the design can be organized in the form of teaching materials that are packaged in the form of learning media, such as media from the audio group, print media in the form of books, modules, leaflets, visuals, and audiovisuals. Learning media can improve students' understanding of concepts (Akbar et al., 2013; Bakar & Ismail, 2020; Entika et al., 2017).

The development of a Physics Module Based on a Scientific Approach to Improve Students' Science Process Skills showed a significant increase in the average test results, reaching 60.98%, and by using the module, students play an active role in building their imagination and knowledge insights in observing, questioning, trying, associating, and communicating through the presentation of illustrations of material or questions in the form of images. These aspects are aspects of one of the skills, namely science process skills (Dewi et al., 2020; Hasan et al., 2020; Herwinarso et al., 2020).

Science process skills are closely related to the skills and character of students. These skills are based on scientific attitudes such as hard work, discipline, honesty, openness, responsibility, creativity, carefulness, thoroughness, and communicativeness (Cenas et al., 2020; Hasan et al., 2020; Rizky et al., 2023). Skills using this science process skills approach can develop various skills. Ideally, the teaching materials, learning media, and learning resources should support the learning process that trains science process skills (Entika et al., 2017; Ismail & Hasan, 2019; Warju et al., 2020). One type of learning resource is a guidebook. A guidebook is a book that can be used as a reference to obtain information and instructions on procedures for conducting an activity. Utilization of the diversity of *Barambai* village has never been done. Therefore, conducting development research on Dragonfly Guidebooks to train science process skills is very appropriate.

2. Methods

This type of research uses educational design research design with Tessmer formative development. The stages of development include (1) self-evaluation, (2) expert test, (3) individual test, (4) small group test, and (5) field test (Tessmer, 1998). The research subjects for preparing this Dragonfly Identification Handbook consisted of three Lambung Mangkurat University lecturers for validity testing and Biology Education students of Lambung Mangkurat University who had taken invertebrate zoology courses.

The details of the number of students are three for individual tests and twenty for field tests to evaluate the effectiveness of the developed products. The object of this research is the Dragonfly Identification Guidebook for the *Barambai Kolam Kanan* area, which was developed to train students' science process skills. The validity instrument was prepared to evaluate the validity of the Dragonfly Identification Guidebook, including coherence or inter-paragraph linkage, readability, vocabulary, word selection, definition and explanation, and application, in research into developing video learning media using quantitative descriptive data analysis techniques. Quantitative descriptive research is research in which data obtained from a sample of the studypopulation will be analyzed by statistical methods that are then interpreted. The alternative answers provided in the questionnaire consisted of four choices, which were (1) not good, (2) good enough, (3) good, and (4) excellent (Ratumanan & Laurens, 2006). Table 1 explains the conversion of scores on the results of the data obtained.

Table 1. Validation Conversion Classification Scores (Ratumanan & Laurens, 2006)

Average Score	Decision
> 3.6	Very Good
2.8 - 3.6	Good
1.9 - 2.7	Good Enough
1.0 - 1.8	Not Good

Table 2. N-Gain Effectiveness Scores (Meltzer & David, 2002)

Average Score	Decision
$g \geq 0.7$	High
$0.3 \leq g < 0.7$	Medium
$g < 0.3$	Low

3. Results and Discussion

3.1. Results

Data on the validity of the Dragonfly Identification Handbook was obtained through the expert review stage by expert validation, including the Biology Education Magister Program lecturers. The validity test of the Dragonfly Identification Handbook was evaluated by three experts on content eligibility, presentation, and language components. The suggestions given by the three validators are summarized in Table 3. The validity data presented for the developed Dragonfly Identification Guidebook is included in the very valid category based on the average value of the three validators, which is 3.44. The effectiveness of the Dragonfly Identification Guidebook in Barambai Kolam Kanan is based on the achievement of student science process skills indicators. Based on the results of the achievement of science process skills indicators assessed from the student worksheet and evaluation questions before being given the Identification Guidebook (pre-test) and after being given the Identification Guidebook (post-test), the improvement of the science process skills of students participating in the Invertebrate Zoology course which includes five indicators in the small test and field test was tested with the normalized gain value formula. This N-gain test was conducted to determine changes or increases in understanding before and after the intervention (Meltzer & David, 2002). The N-gain test is mentioned in Table 3.

Table 3. Data from the results of the Feasibility Assessment Expert Material

Aspects	Item	Score
Content Appropriateness	20	3.50
Material Coherence	10	3.36
Language	12	3.46
Total	42	10.32
Average		3.44

The validity data presented in the table on the dragonfly identification guidebook developed is included in the very valid category based on the average value of the three validators, which is 3.44, with the category very decent. The effectiveness of the Dragonfly Identification Guidebook in Barambai Kolam Kanan is seen based on the achievement of student science process skills indicators. Based on the achievement of science process skills, indicators were assessed from student worksheets and evaluation questions before the Identification Guidebook (pre-test) and after being given the Identification Guidebook (post-test) (Irshaid, 2020).

Table 4. Data from the N-gain test

Aspects of Effectiveness	Target	Actual	Average
Observation	0.7	0.8	0.8
Background Formulation	0.6	0.6	0.6
Data Analysis	0.4	0.6	0.5
Conclusion	0.6	0.7	0.7
Communicate	0.4	0.8	0.6
Average	0.5	0.7	0.6
Category	Medium		

3.2. Discussion

The *Barambai Village Dragonfly Identification Handbook* contains images of each dragonfly species encountered; in addition to containing each dragonfly species, the *Dragonfly Identification Book* includes photographs of male and female dragonflies. The difference in morphology of male and female dragonflies on dragonfly species is the basis for loading male and female illustrations on each species sheet (Widjaja et al., 2020). The illustrations in the *Dragonfly Identification Handbook* are shown in Figure 1.

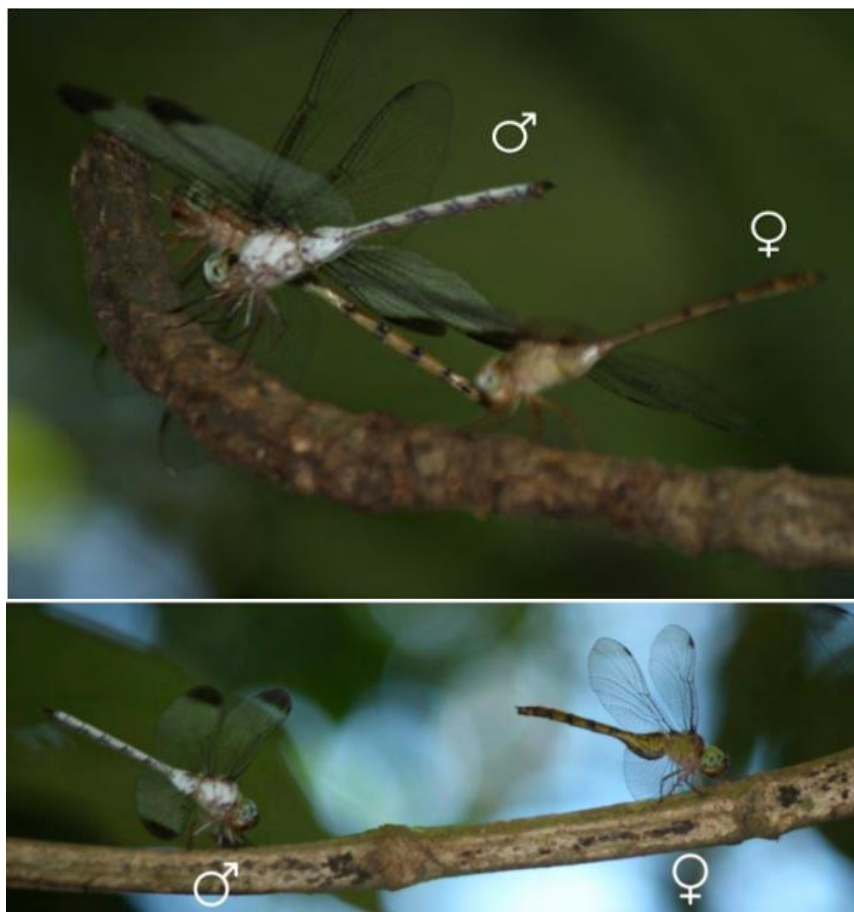


Figure 1. Types of dragonflies are found in lowlands, ponds, rice fields, residential areas, and park areas in *Barambai Kolam Kanan*. This picture has been included in the *Dragonflies Book*.

Realistic and attractive images are expected to help students understand the concept. Using images with original colors is a visual element that is quite important and can give an impression of emphasis and provide a level of realism to the object or situation depicted, show differences or similarities, and increase the attractiveness of learning and attention (Ismail et al., 2018; Rahdiyanta et al., 2019; Suparman, 2012). The completeness and breadth of the material have a score of 4.00, which is a very decent category. The material's completeness and breadth are concern in preparing this Dragonfly Identification Guidebook adapted to the development objectives, namely alternative teaching materials for Invertebrate Zoology courses (Putra et al., 2020; Widjaja et al., 2020). The description of the material presented in the Dragonfly Identification Guidebook is coherent and systematic, containing an introduction to dragonflies, observation procedures, and the diversity of dragonfly species found in the *Barambai Kolam Kanan Village* area. Figure 2 shows the components contained in the book. The components in the book are made sequentially so that students can follow the observation procedure (Manuel & Catherine, 2020; Parusheva et al., 2018).

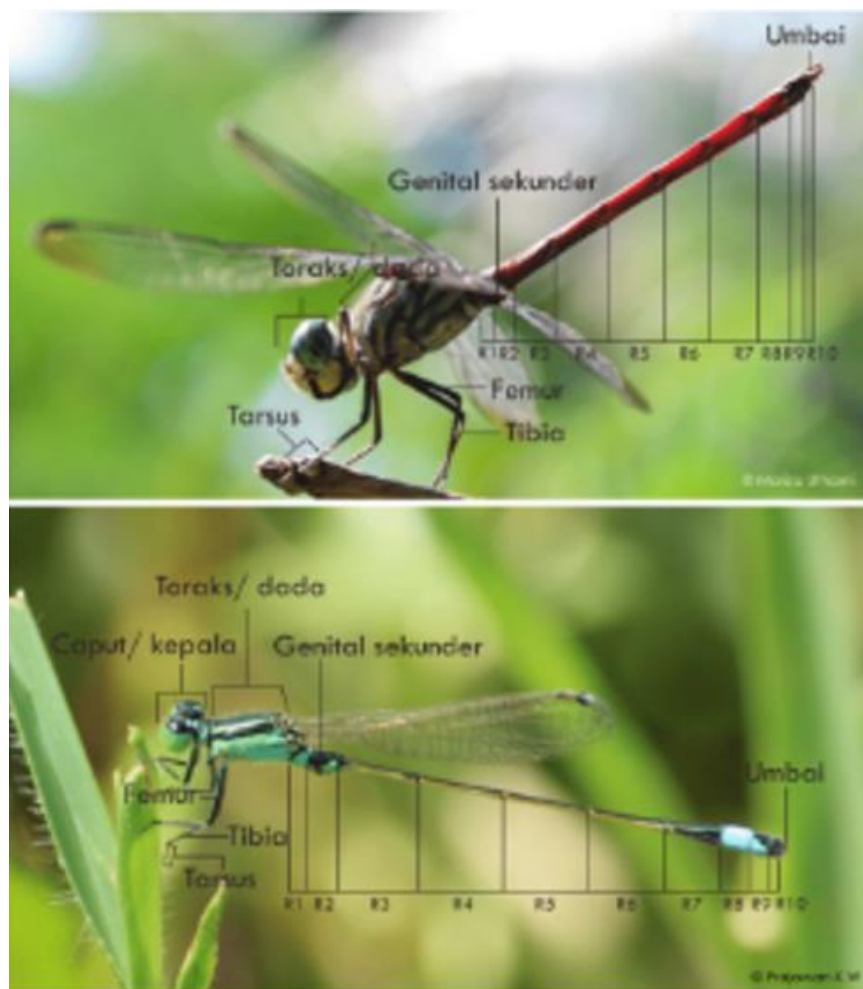


Figure 2. The body of a dragonfly consists of three parts, namely the caput (head), thorax (two segments), and abdomen (ten segments). This picture has been included in the Dragonflies Identification Book.

The complete presentation of the material helps students to get information about the material being studied to create meaningful learning. Dragonfly Identification Guidebook is an alternative teaching material arranged systematically and displays the competencies that students will master



in the learning process. The students facilitated the order and completeness of the content in the learning process and can lead students to think coherently (Bakar & Ismail, 2020; Pamungkas et al., 2020; Prastowo, 2014). The average N Gain value obtained is 0.6 with a moderate category; with this category, the learning conducted with the Identification Guidebook has been categorized as effective for training students' science process skills (Fakhri & Munadi, 2019; Herwinarso et al., 2020; Meltzer & David, 2002;). The improvement of science process skills can occur following the implementation of the use of the Identification Guidebook; this is because the product used has advantages such as the presentation of coherent and systematic material, attractive cover design, learning activities oriented to science process skills, and the completeness of the material presented (Daryono et al., 2020; Dewi et al., 2020; Nashir et al., 2020; Triyono et al., 2018).

4. Conclusions

The Dragonfly Identification Handbook in the Barambai Kolam Kanan Village area has a validation score of 3.44, with a decent category in content feasibility, presentation, and language. The Dragonfly Identification Guidebook in the Barambai Kolam Kanan Village area effectively trains students' science process skills in learning Invertebrate Zoology. The effectiveness of the Dragonfly Identification Guidebook obtained an overall N-Gain value of 0.6 in the medium category.

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