

A Need Analysis for Developing Invertebrate Zoology Practicum Guidelines in Higher Education

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Article History

Received : 07 – 07 – 2022

Revised : 27 – 08 – 2022

Accepted : 06 – 10 – 2022

Keywords:

Media Needs, Practicum
Guide, Invertebrates Zoology

Article link



Abstract

Practical guidelines as learning media in practical activities are needed to facilitate students in an independent study. The purpose of this research is to describe the results of learning media analysis that is needed by students. This research used a qualitative descriptive method. The respondents were 30 students from the Biology Education Study Program, FKIP Balitar Islamic University who had taken the Invertebrate Zoology course. The data analysis technique is to describe the data from the analysis of learning media needs, which are analyzed systematically. The results of this research were 1) students need learning media as guidelines for identifying invertebrate animals in determining species names, 2) learning media that provides material and information through the practical activities presented by the teaching lecturer, 3) Learning media that is easily accessible, presented systematically and uses terms that are easily understood by students. The results of the analysis are expected to be the basis for developing learning media according to student needs.

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Introduction

The learning achievement of the Invertebrate Zoology course expects students to be able to analyze the basic principles of classification based on similarities and differences in the characteristics of invertebrate animals, the role of invertebrate animals for humans, and be able to make cladograms of each member of the invertebrate animal phylum. The material structure of the Invertebrate Zoology course includes the characteristics of morphology, anatomy, physiology, habitat, and the role of invertebrates in the ecosystem. Invertebrate Zoology courses cover student competencies in theory and practice. Students are required to identify and classify various types of invertebrates that they find in the environment in carrying out the Invertebrate Zoology course practicum. The learning process is carried out in an environment (field study) to facilitate students learning contextually (Fraser et al., 2012). Contextual learning can empower critical and powerful thinking skills in understanding surrounding phenomena (Hasrudin et al., 2015). Students are required to have conceptual abilities and science process skills in conducting practicum.

For vertebrate zoology courses, a practicum manual has been the primary source of support for practicum activities. Practical activities need to be supported with learning media that can be a guide for students to identify invertebrate animals from field studies. To identify the types of invertebrate animals, a learning media is needed that can provide valid information regarding the identity and groups of invertebrate animals that students find in the environment. The existence of learning media can increase and direct students' attention so that it can lead to learning motivation, more direct interaction with their

environment and allows students to learn independently according to their abilities and interests (Arsyad, 2013). Inappropriate use of learning media can result in learning objectives not being achieved, as well as an unpleasant learning process for students (Sari, 2019). Appropriate learning media is expected to be able to facilitate the student's independent learning process.

The results of observations through observing student learning behavior had difficulty in identifying more complex invertebrate animals during field studies. Students only rely on General Invertebrate Zoology books and article research results published in a journal. These sources only contain information that is related to the purpose of the research, so that it is often irrelevant to what students need. This condition causes students to be less satisfied and confident with their identification results. Student self-confidence influences student learning achievement (Nurani et al., 2018). Students who are more confident generate more motivation during the learning process. Student motivation can be influenced by the use of learning media. According to Hikmawan & Sarino (2018), the use of learning media has a strong and significant positive influence on students' learning motivation. Therefore, these problems can be solved by utilizing learning media.

Learning media is a messenger technology for learning purposes in supporting the success of the teaching and learning process (Rusman, 2017). In line, the development of science and technology as well as the current industrial revolution, learning media is developing to be more innovative by utilizing information technology, both digital technology, multimedia, and the internet. Based on the result research by Suwarsito et al., (2011) stated that digital learning media can increase enthusiasm for learning and increase student motivation for independent learning. In general, practicum activities identify invertebrates using a dichotomous key, as a medium that presents a series of statements consisting of two lines of description of the characteristics of an organism with opposite features (Randler, 2008). Students must understand the characteristics and variety of the various animal forms identified in order to use the dichotomous key. Manual identification requires high accuracy. Therefore, it is necessary to take advantage of innovative, accessible, and contextual learning media in identifying invertebrate animals. Learning media has great benefits that can directly affect motivation, interest, and being able to visualize something abstract so that it helps students in learning (Atapukang, 2016). In order to find out the learning media needs that students want, a needs analysis is carried out first. The results of this needs analysis will help determine the development of media for guidelines the identification of invertebrate animals in the Invertebrate Zoology practicum according to student's need. It is hoped that the development of learning media for Invertebrate Zoology practicum can increase student motivation and student learning outcomes in Invertebrate Zoology courses.

Methods

The research used a qualitative descriptive method, by describing the research data obtained from the questionnaires for the analysis of learning media needs. The subjects in this study were 30 students of Biology Education study program, FKIP, Balitar Islamic University Blitar who had taken the Invertebrate Zoology course in the previous semester. The research instrument used a needs analysis questionnaire which had been validated by 2 material experts, namely lecturers who had taught Invertebrate Zoology courses. The needs analysis questionnaire was applied using the google form platform to facilitate the dissemination of the questionnaire to students. The questionnaire presents 7 questions related to the needs of the Invertebrate Zoology practicum learning media. These questions consist of:

1. What the Invertebrate Zoology practicum activities have you been involved in?
2. What are your obstacles in the Invertebrate Zoology practicum?
3. Does the existing practicum manual learning media meet your needs to carry out Invertebrate Zoology practicum activities?
4. What are the criteria for learning media that you want to carry out practicum activities in Invertebrate Zoology?
5. What menus do you need in learning media to carry out Invertebrate Zoology practicum activities?
6. What kind of output or knowledge do you need from learning media to support the identification and classification of various types of invertebrates? Tell them!
7. What are your suggestions for developing learning media to identify and classify various types of invertebrates easily?

Data collection was carried out by distributing validated needs analysis questionnaires to the students. The data from the questionnaire results were then used as material for further analysis. Data analysis by describing the data from the needs analysis questionnaire results into the form of percentages and descriptions of opinions, then described in depth to get results in the form of conclusions about the needs of teaching materials that students want.

Results and Discussion

Needs analysis is used to identify potential and problems in research sites (Pramono, 2017). The analysis stage, the potential needs and problems found by researchers are as follows.

1. Invertebrate Zoology practicum activities that have been taken by students.

The results of the needs analysis questionnaire show that 82% of students have done the Invertebrate Zoology practicum activities by observing the morphology and anatomy of experimental animals. In addition, practicum activities that have been carried out by students are the identification of invertebrate animals found in the local environment (32%), surgery and observation (14%), observing and answering discussion questions, and (12%) replied the lecturer in charge of the course. Educators must make improvements and development in order to give students with a diversified learning experience and prevent classroom instruction from seeming monotonous (Murniati et al., 2018).

2. Obstacles of students in the Invertebrate Zoology practicum.

The biggest obstacle in the invertebrate zoology practicum is determining the name of the animal species found in the environment with 36.7% of the responses. To be able to explain the characteristics of living things, similarities or differences, sometimes they find it difficult because not all students have seen or know about living things that are objects (Ardiyanti et al., 2022). In addition, the cause of students finding it difficult to determine the taxon because students do not understand how to read the key of determination to be able to classify the animals observed. Because of using the key of determination students must be careful and understand technical terms and instructions (Kirchoff et al., 2014) because the current trend of learning is not focused on the organism or species level (Silva et al., 2011). Another component that becomes an obstacle in the Invertebrate Zoology practicum is that there is no guide to the identification of animals and equipment which alternately gets a percentage of each respondent of 20%. Guidebooks and learning tools have an important role to make it easier for students to understand the material being taught. Maulidatul et al., (2019), stated that the practicum guidebook is a learning resource specifically designed to support the practicum learning process by prioritizing independence in exploring the understanding of material obtained during theoretical learning in class through direct practice. In addition, the implementation of biology practicum requires a special place, namely a laboratory and special learning resources for optimizing the process and results of practicum learning in the form of a practicum guide book (Mahrawi, Ika Rifqiawati, 2022). On the other hand, the ideal practicum implementation needs to be supported by the ability of lecturers to think critically and creatively in overcoming the limitations of tools and materials available in the laboratory (Ludfia Fatmawati, Berti Yolida, 2017). Therefore, it is necessary to develop a special practical guide book, to support student activities to identify animals that suit student needs. Another obstacle besides the absence of animal identification guides and limited equipment is the lack of clear practicum instructions that get a response of 10%. Practical activities are part of the learning process which aims to give students the opportunity to test and implement what is obtained in theory in real situations (Rahmadani et al., 2017). Furthermore, Mahrawi, Ika Rifqiawati (2022), explained that the practicum guide contains a summary of materials, tools and practicum materials, work procedures/stages and tasks that must be completed by students which are usually not available in other learning resources, such as textbooks which are dominated by materials and assignments. Another obstacle that received the lowest percentage of 6.7% was the difficulty of finding the observed animals. Invertebrate Zoology courses often use teaching resources from the environment as practical material. The difficulties experienced by students can be caused by a lack of student motivation in looking for observed animals in the surrounding environment. Living organisms as original media are very useful in the Biology learning process (Rahmawati, 2015).

3. Student response to the existing practicum manual learning media for conducting Invertebrate Zoology practicum activities.

This third question is the form of a combination question, where answer options have been provided but ask students to explain the reasons for their answers. The largest response gave the answer "not yet" with a percentage of 70% or as many as 21 students stating that the practicum manual was not complete. In the practicum manual there is no guide for identifying the names of invertebrate animal species in field studies. To complete the information on the results of practicum students still need other media. The practicum manual only contains practicum objectives, a little theoretical basis, tools and materials needed, working steps, and discussion questions. Rahmawati (2015), states that lecturers should be able to choose the appropriate media to be used in the learning process in the classroom, so as to support the learning outcomes that have been planned. Furthermore, 30% of students stated that the answer was "enough". Because according to students, the practicum manual has provided a reference for students in conducting Invertebrate Zoology practicum using a dichotomous key, but not finding the species name.

4. Criteria for learning media that students want to carry out practicum activities in Invertebrate Zoology.

The answer to this question is very diverse and cannot be separated from the learning media that have existed so far. Respondents want practicum learning media to be arranged systematically, containing complete information about the observed animals. To identify invertebrate animals from field studies, students must observe the morphological characteristics of the animals carefully, but the characteristics found are not in accordance with the information in the practicum manual. In addition, practicum learning media should also be equipped with clear pictures and descriptions so that they are easy to understand. The use of practicum guides that are not only in the form of writing, but equipped with pictures and sounds are more attractive to students in the learning process (Alexander et al., 2018). According to respondents, the dichotomous key in the current practicum manual should be adapted to the description of the characteristics of invertebrate animals that are often found around.

5. Menus needed by students in learning media to carry out Invertebrate Zoology practicum activities.

The menu that is needed by respondents in general does not provide specific answers. Invertebrate Zoology practicum activities so far aim to identify morphological and anatomical structures to understand similarities and differences, determine the species of invertebrate animals found from field studies, and determine the taxon hierarchy of invertebrate animals. Respondents need learning media that can help them achieve learning goals easily and effectively. This is in line with Fitriah (2016) statement that in Invertebrate Zoology learning activities students still have the habit of relying on information provided by lecturers. Even though every student is directed to be able to learn independently and be responsible for the practicum activities carried out. Practicum handbooks are used to assist in carrying out practicums which contain instructions regarding procedures for preparing, implementing and reporting practicums and can provide information, support learning, and serve as a guide for students in conducting practicums (Novita, 2020).

6. The output or knowledge required from the learning media to carry out the Invertebrate Zoology practicum activities.

This question is expected to be able to explore the specific knowledge needed by students to carry out Invertebrate Zoology practicum activities. Respondents need material accompanied by pictures of invertebrate animals that are presented in full in accordance with practical activities. Pictures are the most commonly used media in learning, which is generally stated that pictures are easy to understand and enjoy everywhere (Arief S. Sadiman, 2009). In addition, respondents need learning media that can quickly provide information about the position of invertebrate animals at the taxon level. The effectiveness and efficiency of using media is determined by the ease with which students absorb the information presented in learning media and the use of learning media can reduce the time, cost, and energy spent in achieving learning objectives (Abdullah, 2017). The students often still have difficulty distinguishing invertebrate animals from one another.

7. Suggestions for students to develop learning media to make it easier to do Invertebrate Zoology practicum activities.

In the needs analysis stage, student suggestions become an important point for the development of further learning media. Respondents need learning media for practical activities that can provide complete and valid information when identifying invertebrates. The learning media presents pictures with descriptions to make it easier to find the identity of invertebrate animals from field studies. In addition, the learning media is easy to use, the explanation is complete and easy to understand. Ideally, learning media should be interesting, close to students and make them happy and familiar (Mana, 2021).

Conclusions and Recommendations

Based on the results of the needs analysis questionnaire, it can be concluded that 1) students need learning media as a guide for identification of invertebrate animals, 2) learning media that presents complete and valid images, materials and explanations in accordance with the practicum activities presented by the supporting lecturers, 3) Media learning that is easy to use, presented in an interesting and systematic way, and uses terms that are easily understood by students. It is hoped that the results of this needs analysis can serve as a guideline in developing learning media for further invertebrate zoology practicums to make it easier for students to carry out practicum activities and learning objectives can be achieved.

References

- Abdullah, R. (2017). Pembelajaran Dalam Perspektif Kreativitas Guru Dalam Pemanfaatan Media Pembelajaran. *Lantanida Journal*, 4(1), 35. <https://doi.org/10.22373/lj.v4i1.1866>
- Alexander, A., Rahayu, H. M., & Kurniawan, A. D. (2018). Pengembangan Penuntun Praktikum Fotosintesis Berbasis Audio Visual Menggunakan Program Camtasia Studio di SMAN 1 Hulu Gurung. *Jurnal Pendidikan Sains Indonesia*, 6(2), 75–82. <https://doi.org/10.24815/jpsi.v6i2.12075>
- Ardiyanti, Y., Budiman, I., Puspito, H., & Sofia Kahirani, N. (2022). Analisis Kesulitan Siswa dalam Menentukan Klasifikasi Makhluk Hidup Menggunakan Kunci Determinasi. *Journal of Research in Science and Mathematics Education (J-RSME)*, 1(1), 1–8. <https://doi.org/10.56855/jrsme.v1i1.11>
- Arief S. Sadiman, D. (2009). *Media Pendidikan*. Raja Grafindo Persada.
- Arsyad, A. (2013). *Media pembelajaran; Edisi revisi*. PT. Rajagrafindo Persada.
- Atapukang, N. (2016). Kreatif Membelajarkan Pembelajar Dengan Menggunakan Media Pembelajaran yang Tepat Sebagai Solusi Dalam Berkomunikasi. *Ejournal Undiksha*, 17(2), 45–52.
- Fitriah, E. (2016). Implementasi Model Modified Free Inquiry Pada Pembelajaran Zoologi Avertebrata Untuk Menumbuhkan Karakter Kreatif Dan Keterampilan Kerja Ilmiah Mahasiswa Calon Guru Biologi. *Holistik: Journal For Islamic Social Sciences*, 1(2), 134–145.
- Fraser, B. J., Tobin, K. G., & McRobbie, C. J. (2012). Second International Handbook of Science Education. *Second International Handbook of Science Education*, 1–1564. <https://doi.org/10.1007/978-1-4020-9041-7>
- Hasrudin, Nasution, M. Y., & Rezeqi, S. (2015). Application of contextual learning to improve critical thinking ability of students in biology teaching and learning strategies class. *International Journal of Learning, Teaching and Educational Research*, 11(3), 109–116. <https://www.ijlter.org/index.php/ijlter/article/viewFile/317/158>
- Hikmawan, T., & Sarino, A. (2018). Pemanfaatan Media Pembelajaran Berbasis Edmodo Terhadap Motivasi Belajar Siswa Sekolah Menengah Kejuruan. *Jurnal Pendidikan Manajemen Perkantoran*, 3(1), 226. <https://doi.org/10.17509/jpm.v3i1.9459>
- Kirchoff, B. K., Delaney, P. F., Horton, M., & Dellinger-Johnston, R. (2014). Optimizing learning of scientific category knowledge in the classroom: The case of plant identification. *CBE Life Sciences Education*, 13(3), 425–436. <https://doi.org/10.1187/cbe.13-11-0224>
- Ludfia Fatmawati, Berti Yolida, R. R. T. M. (2017). Analisis Pelaksanaan Praktikum Materi Organisasi Kehidupan dan Permasalahannya SMP Se-Kecamatan Kedamaian. *Jurnal Bioterdidik: Wahana ...*, 1. <https://core.ac.uk/download/pdf/289778335.pdf>
- Mahrawi, Ika Rifqiawati, D. M. (2022). Pengembangan Panduan Praktikum Biologi pada Konsep Sistem Pencernaan untuk Mengembangkan Keterampilan Berpikir Kritis. *Journal of Nusantara Education*, 1(2), 68–78. <http://journal.unu-jogja.ac.id/fip/index.php/JONED> Pengembangan
- Mana, L. H. A. (2021). Respon Siswa Terhadap Aplikasi Tiktok Sebagai Media Pembelajaran Bahasa Indonesia. *JIRA: Jurnal Inovasi Dan Riset Akademik*, 2(4), 428–429. <https://doi.org/10.47387/jira.v2i4.107>
- Maulidatul, H. A., Ismail, & Mukhlisoh, S. S. (2019). Pengembangan Modul Biologi Benilai Islami Materi Sistem Reproduksi pada Manusia. *Bioeduca: Journal of Biology Education*, 1(65), 18–28. <https://journal.walisongo.ac.id/index.php/BIOEDUCA/article/view/4951/2371>
- Murniati, Sardianto, M. ., & Muslim, M. (2018). Pengembangan Petunjuk Praktikum Fisika Sekolah I Berbasis Keterampilan Proses Sains Mahasiswa Calon Guru. *Jurnal Inovasi Dan Pembelajaran Fisika*, 5(1), 15–25.
- Novita, E. (2020). Pengembangan Buku Pedoman Praktikum Berbasis Keterampilan Proses Dasar Sains Kelas IV Sekolah Dasar. *Journal Evaluation in Education (JEE)*, 1(1), 34–41. <https://doi.org/10.37251/jee.v1i1.38>
- Nurani, Sunarto, & Wardani, D. K. (2018). Pengaruh Kepercayaan Diri dan Motivasi Berprestasi Terhadap Prestasi Belajar Peserta Didik Pada Mata Pelajaran Ekonomi di SMA Negeri 8 Surakarta. *Jurnal Pendidikan Bisnis Dan Ekonomi*, 4(1), 1–13.
- Pramono. (2017). *Pengembangan Kunci Determinasi Elektronik Sebagai Media Pembelajaran Pada Materi Klasifikasi Tumbuhan Kelas X Sma/Ma*. 136.
- Rahmadani, S., -, J., & Zulkifli, L. (2017). Pengembangan Petunjuk Praktikum Biologi Dan Instrumen Penilaian Kinerja Praktikum Berbasis Model Pembelajaran Kooperatif Dan Efektivitasnya Terhadap Kemampuan Berpikir Kritis Siswa Sma/Ma Kelas Xi. *Jurnal Penelitian Pendidikan IPA*, 1(2), 0–12. <https://doi.org/10.29303/jppipa.v1i2.13>
- Rahmawati. (2015). Kelayakan Aves Yang Terdapat Di Kawasan Wisata Taman Rusa, Kecamatan Sibreh, Kabupaten Aceh Besar Sebagai Media Pembelajaran Pada Mata Kuliah Zoologi Vertebrata. *Jurnal Jesbio*, 4(1), 5–8.

- Randler, C. (2008). Teaching species identification - A prerequisite for learning biodiversity and understanding ecology. *Eurasia Journal of Mathematics, Science and Technology Education*, 4(3), 223–231. <https://doi.org/10.12973/ejmste/75344>
- Rusman. (2017). *Belajar dan Pembelajaran Berorientasi Standar Proses Pendidikan (1st ed.; Suwito, ed.)* (1st ed.). Kencana.
- Sari, P. (2019). Analisis Terhadap Kerucut Pengalaman Edgar Dale Dan Keragaman Dalam Memilih Media. *Jurnal Manajemen Pendidikan*, 1(1), 42–57.
- Silva, H., Pinho, R., Lopes, L., Nogueira, A. J. A., & Silveira, P. (2011). Illustrated plant identification keys: An interactive tool to learn botany. *Computers & Education*, 56(4), 969–973. <https://doi.org/10.1016/J.COMPEDU.2010.11.011>
- Suwarnito, Sutomo, & Fauziah, D. (2011). Pengembangan Media Pembelajaran Digital Mata Kuliah Geografi Perkotaan dalam Peningkatan Motivasi Belajar Mahasiswa (Digital Learning Media Development in Urban Geography Subject for Increasing Student Learning Motivation). *Juita*, 1(3), 91–95.