

Preliminary Analysis for Development of Animal Ecology Practical Guide Based on Guided Inquiry

Rivaldi Putra Jamal^{1*} Yuni Ahda²

¹ Student of Master Degree Program Biology Department, Math and Natural Science Faculty, Universitas Negeri Padang, Padang, Indonesia

² Biology Department, Math and Natural Science Faculty, Universitas Negeri Padang, Padang, Indonesia

*Corresponding author. rivaldiputrajamal@yahoo.com

ABSTRACT

Animal ecology is a part of biological science that involves interactions between animals and their environment. In the process of learning it requires correlation with observation activities in the practicum process. In the implementation of the Practicum, a practical guide is needed. The purpose of this study was to reveal, analyze, and explain the fact that it was important to develop a animal ecology practical guide based on guided inquiry approach. This research was conducted at STKIP PGRI West Sumatra in August 2018. The first step in Plomp's design development was a preliminary analysis. This preliminary analysis consists of curriculum analysis, practical guidance analysis, lecturer response analysis, problem analysis and need analysis. From the curriculum analysis it is found that there are eight practicum meetings that can be elaborated in the Semester Learning Plan. Furthermore, the analysis of practical guides shows that practical guides did not have a scientific approach so that they did not facilitate students in finding concepts scientifically. Lecturer response analysis states that it was necessary to develop a guide to animal ecology practice. Analysis of the problem shows that many students were not too well-versed on how to practice scientific methods such as observation, formulating problems, making hypotheses, testing hypotheses and making conclusions. While in the needs analysis students want a practical guide with cleared images, cleared scientific steps and a better practical guide display.

Keywords: Analysis, Animal Ecology, Guided Inquiry, Practical Guide, Preliminary.

1. INTRODUCTION

Education is one that determines the progress of a nation. The progress of a nation will be very important because of the quality of education, because with education will be born reliable human resources first to follow the development of science and technology. To maintain the quality of education it is necessary to have professional teachers formed from the Educational Workforce Education Institute (LPTK). STKIP PGRI West Sumatra is a LPTK which is a teacher producing institution. One of the teachers produced was a biology teacher.

Animal Ecology is a compulsory subject for Biology Education Study Program students with a weight of 3 SKS, with the provision of 2 SKS for face-to-face activities and 1 SKS for practicum activities[1]. Based on the Semester Learning Plan (RPS) of Biology Education Study Program, one of the learning achievements (learning outcomes) of animal ecology courses is students who teach basic concepts, principles and procedures, scientific work, at least in accordance with the development and breadth for learning in schools, as well as the application of animal ecology in the Environment, the use of natural resources. With the achievement of learning through scientific work, it is very important to choose the right strategy, media and

learning tools so that the competence of students can run optimally.

Scientific work is an activity that addresses the scientific method[2]. Scientific questions raised are questions that discuss hypotheses, make provisional guesses or hypotheses, test hypotheses, analyze data and make conclusions. The learning process using scientific work can familiarize scientific education in accordance with the findings of scientists in finding concepts[3]. In animal ecology, scientific work that can be integrated in learning tools, one of which is in a Practical guide.

Practical guide is a student activity sheet that contains instructions and questions that must be asked by students to find a concept and presented in the form of experimental activities in the laboratory[4]. Practical guides are practicum facilities that help students in carrying out practicum activities[5].

The purpose of this study is to reveal the initial analysis needed to develop an Animal Ecology practical guide based on Guided Inquiry to fit the expected learning outcomes.

2. MATERIALS AND METHODS

This research was a descriptive study to determine the need to develop an animal ecology practical guide based on a guided inquiry approach for students. This research conducted at STKIP PGRI of West Sumatra in the biology education studied program. There were several steps taken in the studied. They were as following:

2.1. Curriculum Analysis

Curriculum analysis aims to saw the learning outcomes and subject matter of the course on animal ecology. This analysis was used as a basis for determining the material and practical objectives of the developed animal ecology practical guides.

2.2. Practical Guide Analysis

The guiding analysis of the practicum was carried out to find out the contents of the animal ecology practical guide commonly used by students. Practical guiding analysis aims to find out whether the practical guide used had an approach or not, and knows the components contained in the practical guide. The analysis was carried out on the guide of animal ecology practicum in STKIP PGRI west sumatra.

2.3. Analysis of Animal Ecology Lecturer Response

Analysis of the response of lecturers of animal ecology aims to find out the problems found in the practical guide used in practical activities. Information on animal ecology lecturer responses was obtained by using an opened questionnaire.

2.4. Analysis of Student Problems and Needs

Problem analysis was carried out to find out the problems faced by students in animal ecology practicum activities. While the needs analysis was done to determine the characteristics of practical guides that were liked by students. The activities carried out at this stage were by giving questionnaires to students. The results of the needs analysis were used as a benchmark in designing and developing animal ecology practical guides based on guided inquiry approach.

3. RESULT AND DISCUSSION

The results obtained at the Preliminary Analysis were explained as follows:

3.1. Curriculum Analysis

Curriculum analysis is done by reading and understanding learning outcomes in Animal Ecology courses contained in the Semester Learning Plan (RPS). Based on the analysis of existing learning outcomes, the indicators and objectives for each activity are explained. The results of the analysis are used as a basis for formulating indicators and learning objectives as well as the concepts needed in learning activities. Based on the analysis, indicators are formulated as in Table 1.

Table 1. The Title and Purpose of the Practicum in accordance with the Curriculum Analysis on Learning Outcomes.

Learning Outcomes	The Title	The Purpose
Students are able to explain methods of measuring population abundance	1. Growth Population	<ul style="list-style-type: none"> 1. Students are able to do population growth analysis. 2. Students can measure the growth rate of <i>Tribolium cartaneum</i> (flour beetle) or <i>Sitophylus oryzae</i> (rice beetle) on various food items. 3. Students have skill in doing laboratory work, carefully observing objects and calculating practicum objects.
Students are able to explain about animal responses	1. Animal Response	<ul style="list-style-type: none"> 1. Students are able to analyze animal responses 2. Students understand the source of stimulation, taxis, tropism and kinesis 3. Students have skill in doing laboratory work, especially discipline, and careful observing of objects and counting practicum objects
Students are able to explain, analyze about the community	2. Reaction of Aquatic Animals to Salinity	<ul style="list-style-type: none"> 1. Students understand the animal reaction process 2. Students understand the source of stimulation and tolerance to environmental factors 3. Students have skill in doing laboratory work, especially discipline, and careful observing of objects and counting practicum objects
Students are able to explain about animals and the environment	4. Succession	<ul style="list-style-type: none"> 1. Students understand the process of succession 2. Students understand the type of succession and the types of animals found during the succession process 3. Students have skill in doing laboratory work, especially discipline, and careful observing of objects and counting practicum objects
Students are able to explain about animals and the environment	5. Biotic Environmental Factors	<ul style="list-style-type: none"> 1. Students understand the ways to collect animals in the environment 2. Students have skill in collecting terrestrial animals by various methods (pit fall traps, extraction of land animals, light traps, capture recaptures) 3. Students have skill in collecting aquatic animals by various methods (surber net, eckmandrage, plankton net) 4. Students understand the relationship of biotic environmental factors with other living things 5. Students have skill in doing laboratory and field work, especially discipline, and careful observing of objects and counting practicum objects
Students are able to explain about animals and the environment	6. Abiotic Environmental Factors	<ul style="list-style-type: none"> 1. Students understand how to measure abiotic environmental factors 2. Students have skillin using tools used to measure environmental factors on the mainland. 3. Students have skillin using tools used to measure environmental factors in water. 4. Students understand the relationship of abiotic environmental factors with other living things 5. Students have skillin doing laboratory and field work, especially discipline, and careful observing of objects and counting practicum objects
Students are able to explain about the adaptation of animals to the environment	7. Adaptation	<ul style="list-style-type: none"> 1. Students understand the process of adaptation in animals 2. Students understand morphological and structural adaptations 3. Students have skill in doing laboratory work, especially discipline, and careful observing of objects and counting practicum objects

From Table 1 it can be seen that the results of the analysis in the Animal Ecology course obtained 7 practical activities that will be carried out by students. Supporting, theories that can be used in classroom learning supported by practical activities.

3.2. Analysis of Animal Ecology Practical guides

The analysis of animal ecology practical guide aims to find out the components that need to be improved on the practical guide. The components analyzed are the type of approach used, the accuracy and appropriateness of the material with the RPS, the correctness of the concept, the completeness of the guiding components, and the language used. The practical guide analyzed was the practical guide used in the Laboratory of STKIP PGRI West Sumatra which was written by a team of Animal Ecology Lecturers. The analysis shows that the practical guide used does not yet have a learning approach. Practical guides are presented without going through stages of scientific work such as formulating problems, formulating hypotheses, testing hypotheses, analyzing data and making conclusions. Students are directly focused on following the steps in the guiding lab, so that it is feared that students will not be able to develop students' scientific attitudes and are less honed in solving problems in animal ecology. This is a consideration for researchers to develop a guide to animal Ecology practicum based on guided inquiry approaches that can facilitate students to work scientifically in practicum activities.

The practical guide is a conventional type of guide that contains the title, practical purpose, basic theory, tools and materials, ways of working and some data analysis tables. Practical guides used from year to year are always the same and almost do not experience updating or adding information. This situation causes some of the volunteers to copy and paste reports on the results of the practicum activities of seniors. In addition, the guide of animal Ecology practicum that is used is still verification by using a cookery book type guide. The prescription model requires students to work according to the steps written in the practical guide, without any exploration from the students themselves.

3.3. Analysis of Problems and Needs of Biology Education Study Program Students STKIP PGRI West Sumatra

3.3.1. Analysis of Problems

Problem analysis aims to find out the difficulties and obstacles experienced by students during Animal Ecology practicum activities. From the questionnaire analysis of the problems of animal Ecology practicum activities obtained the results that: First, in the implementation of practicum

students tend to be passive and not fully involved. The results of the questionnaire showed that only 43% of students were active in practicum activities. Second, practical guides place more emphasis on results not on process. This is likely due to the practical guide not having an approach and not yet facilitating students in working scientifically so that during the practicum activities students cannot find knowledge and ideas with their own efforts, and only focus on results. The results of the questionnaire showed that 67% of students have not been able to master the steps of the scientific method such as formulating problems, formulating hypotheses, testing hypotheses, analyzing data and concluding. Third, students are less interested in the appearance of animal ecology practical guides. The results of the questionnaire showed 63% of students stated that the practical guide did not have an interesting color combination.

3.3.2. Analysis of Needs

The needs analysis is done to find out the characteristics of practical guides that are developed to suit the needs of students. Based on the needs analysis questionnaire in the practicum activities that have been carried out, the results are obtained that 100% of students need a guide to animal ecology labs consisting of covers, preface, instructions for using the guide, practicum rules, table of contents, list of tables, list of pictures, and introduction of tools laboratory. Furthermore, 100% of students need an Animal Ecology guide that directs to the problem to be solved, makes it easier to determine hypotheses, makes it easy to conduct observations or conduct experiments, makes it easy to collect data, makes it easy to process information that has been collected from experiments that have been conducted, and easy to convey observations and make conclusions.

The results of the needs analysis also obtained information that students needed the appearance of an Ecology animal guide with a cover with the highest percentage of three choices: 70% chose brown, 63% chose blue, and 33% chose black. Furthermore, for the contents of practical guides 70% of students want dominant brown, 60% orange, and 50% black. For the type of font on the cover of the practical guide, students choose 57% with the type of writing Helvlight, 53% with the type of Times New Roman, and 43% with the type of Cambria. While for the type of font on the content of the practical guide, students choose 80% with the type Cambria, 73% with Times New Roman, and 50% with Calibri. For the title of the guided inquiry approach step, students choose 53% with the type of HelvLight, 43% with the Times New Roman, and 40% with the Cambria. And for the image that students want for the cover is a picture of bees and hives from <http://bit.ly/2VF7TgY>.

Animal ecology practical guides are needed in practical activities that are useful for strengthening theories learned in class. Curriculum analysis is carried out to match those designed for learning outcomes. This analysis results at an appropriate achievement indicator with the learning

outcomes so the material involves practical activities in learning achieved[6]. Having guided inquiry-based animal ecology practical guides gives students the ability to develop their scientific work. By having the instructional material, students would have big chance in developing their skills[7].

Practical guide is an orientation of practical implementation that contains ways of preparation, data analysis implementation and report of practical activity which have been done. Practical guide aims for helping and guide students to work continuously and targeted[8]. Based on this, there is a need for practical guides that can facilitate students in gaining understanding and scientific work skills and be able to increase student activity in finding their own concepts in learning. Efforts that can be made to familiarize students as prospective teachers do the science process, through practicum activities that are supported by practical guides by obtaining inquiry.

4. CONCLUSION

This preliminary analysis consists of curriculum analysis, practical guidance analysis, lecturer response analysis, problem analysis and need analysis. From the curriculum analysis it is found that there are eight practicum meetings that can be elaborated in the Semester Learning Plan. Furthermore, the analysis of practical guides shows that practical guides did not yet had a scientific approached so that they did not facilitate students in finding concepts scientifically. Lecturer response analysis states that it was necessary to develop a guide to animal ecology practicum. Analysis of the problem shows that many students were not too well-versed on how to practiced scientific methods such as observation, formulating problems, making hypotheses, testing hypotheses and making conclusions. While in the needs analysis students want a practical guide with cleared images, cleared scientific steps and a better practical guide display.

REFERENCES

- [1] BAAK. 2016. *Buku Pedoman Akademik Penyelenggara Pendidikan Tahun Akademik 2016/2017*. Padang: STKIP PGRI Sumatera Barat Press
- [2] Tang, X., Coffey, J. E., Elby, A., & Levin, D. M. (2010). The scientific method and scientific inquiry: Tensions in teaching and learning. *Science Education*, 94(1), 29-47.
- [3] Subagyo, Y., Wiyanto, Marwoto, P .2009. "Pembelajaran dengan Pendekatan Keterampilan Proses Sains untuk Meningkatkan Penguasaan Konsep Suhu dan Pemuaian". *Jurnal Pendidikan Fisika Indonesia*, 5(1): 42-46.
- [4] JWayan, I. 2010. Standar Nasional Pendidikan. Jakarta: Az-Zahara Book's.
- Suggestion of inquiry can be divided into three types, discussed: guided inquiry, free inquiry. The definition of inquiry is essentially a process of finding something scientific so that learning inquiry is identical to process skills[9]. Practical guides that use guided inquiry, students are guided by complete mentors such as problem formulation guides and provide verification procedures to solve problems. Guided inquiry learning is usually used for students who have not experienced learning with inquiry[10]. In free inquiry, the procedure is not provided by the lecturer, so students formulate their own problems and solve their own methods for solving problems. While in free inquiry, the practicum process between guided inquiry and free inquiry. Taking students of Biology Education Study Program STKIP PGRI West Sumatra have not experienced learning with inquiry in animal ecology practicum, the practical guide developed will use guided inquiry.
- [5] Kilinc, A. 2007. The Opinions of Turkish Highschool Pupils on Inquiry Based Laboratory Activities. *Online Submission*, 6(4).
- [6] Sylvia, R., Anhar, A., & Sumarmin, R. 2017. Need Analysis to Develop of Biology Practical Guide Based on Science Process Skills for Student of Senior High School Grade XI. *International Journal of Progressive Sciences and Technologies*. Vol. 6 No. 1 December 2017, pp. 131-136
- [7] Permanasari, A., Hamidah, I., & Widodo, A. (2013). The Analysis of Science Teacher Barriers In Implementing Of Science Process Skills (SPS) Teaching Approach At Junior High School And It's Solutions, 4(27), 185–191
- [8] Zulyetti, D. 2012. Pengembangan Penuntun Praktikum Biologi Berbasis Inkuiri Terbimbing Untuk Kelas XI SMA Semester 1. Thesis. Padang: Unpublished.
- [9] Dewi, N. L., Dantes, N., & Sadia, I. W. 2013. "Pengaruh model pembelajaran inkuiri terbimbing terhadap sikap ilmiah dan hasil belajar IPA". Pendasi: *Jurnal Pendidikan Dasar Indonesia*, 3(1).
- [10] Hosnah, W. M. 2017. "Pengaruh Model Pembelajaran Inkuiri terbimbing Terhadap Hasil Belajar Fisika di SMA". *Jurnal Pembelajaran Fisika*, 6(2), 196-200.