

Valid Practical Handbook of Guided Inquiry Approach Oriented on Animal Physiology Lesson

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Abstract - The practical handbook can foster activeness, independence, and involvement of students in practicum and understand the concept of practicum material. This study aims to produce practical handbook oriented guided inquiry approach in animal physiology to the valid. This research is development research. This research uses 4-D model and its implementation is limited to develop stage, that is validity. Data obtained from the questionnaire of validity with aspects assessed include aspects of student characteristics, material elements, language, and syntax inquiry. The validator is determined by purposive sampling, consisting of Animal Physiology expert, Strategist, and Learning Media and Linguist. The data were processed quantitatively and analyzed descriptively. Validity test results are at very valid criteria, with an average validity value of 95.95%. Based on the value of validity, it is concluded that Practical handbook oriented by guides inquiry approach in animal physiology subject valid and feasible for use by lecturers and students.

Keywords – Practical Handbook, Guided Inquiry, Validity.

I. INTRODUCTION

Learning in college, in addition to providing material or concepts must also provide a learning experience that is able to grow students' creativity and independence in learning. One learning activity that demands student creativity and independence is practicum. One of the courses practiced in the Biology Education program of STKIP PGRI West Sumatra is Animal Physiology.

The Animal Physiology course is a compulsory subject in the Biology Education program of STKIP PGRI West Sumatra. This course is a branch of science that discusses physiological processes that occur in the bodies of vertebrate animals. Achievement of learning from the subject requires active and creative students to find their knowledge independently in understanding concepts, theories, principles, physiological mechanisms, and their regulations and breaking down, assembling, comparing and modifying physiological processes in relation to fluctuations

in environmental factors through practical activities. To understand the mechanism students need to develop science skills, think creatively, think critically, have the skills to analyze data, communicate results, foster a positive attitude and interest, the ability to work together and increase awareness of the environment (Sumintono et al., 2010). One of the factors that can support creativity, independence and student skills in conducting practical activities is the availability of adequate practicum guides.

The Practical guide is one form of teaching material. The Practical Guide is a guideline or manual that is compiled following the rules of scientific writing to assist in the implementation of practicum and contains the experimental title, objectives, theoretical basis, tools, materials and questions that lead to the goal (Musyarofah, 2006). Practical guides are compiled and written by a group of teaching staff who handle the practicum by following the rules of scientific writing (Ministry of National Education, 2006).

The components contained in the practical guide according to Rohman and Sofan (2013) are a) introduction, b) practicum objectives, c) theoretical basis, d) tools and materials, e) work steps/ procedures, f) data results of observation, g) discussion and h) questions and conclusions.

The practical guide is intended to facilitate and provide information assistance or lecture material as a guide for students in conducting practical activities. The function of the practicum guide is as teaching material that can minimize the role of the lecturer, making students more active and acquiring meaningful knowledge, making students gain creative thinking and hands-on skills, making it easier for educators to carry out teaching in the laboratory (Prastowo, 2011).

Based on observations made on students and lecturers of the STKIP PGRI West Sumatra Biology Education study program, it was found that the practicum guides used were not able to lead active and creative students to find out their own knowledge and have not been able to develop student science skills so that fully achieved. The Practical guide used only consists of the introduction of material, work steps and questions. For this reason, it is necessary to develop a practical guide that is able to lead students to be active, creative and independent in building their knowledge, practicing science skills and forming active, productive and conducive educational interactions between students and lecturers.

Based on the results of the analysis of student needs and carried out curriculum analysis, it was found that the practical guideline design model was in accordance with the characteristics, student needs and curriculum, namely guided inquiry-oriented practicum guidance, so approach-based practical guidance had been developed. guided inquiry in Animal Physiology courses. Guided inquiry is a process that students take to solve problems, conduct experiments, collect and analyze data and draw conclusions with learning activities the teacher provides extensive guidance or guidance to students (Kusuma, 2011). The guided inquiry learning aims to make students better understand basic concepts and ideas, help in using memory and transfer in new learning process situations, encourage students to think and work hard on their own initiative, encourage students to think intuitively and formulate hypotheses itself, providing satisfaction that is intrinsic and motivating to be active in the learning process. Suardana (2007) states that through inquiry learning models, students are actively involved in observing, measuring and collecting data to draw conclusions.

Guided Inquiry learning characteristics include: 1. learners' abilities from specific observations lead to inference or generalization, 2. the purpose is to strengthen the process of testing events or objects and then arrive at generalizations that are in accordance with the results of observations, 3. the teacher controls the learning process, data, material or object and acts as the class leader, 4. each student reacts and tries to build a meaningful pattern based on the observations of himself and others in the class, 5. the class functions as a learning laboratory and 6. The teacher motivates students to communicate the generalizations that they have produced to their classmates so that they benefit each student (Jufri, 2013). The guided inquiry steps are as follows: a) identification and mapping of the scope of the problem, b) planning and predicting results, c) investigations for data collection, d) interpretation of data and developing conclusions, and e) reflecting (Kemendikbud, 2014)

The cognitive abilities of students of the STKIP PGRI West Sumatra Biology Education study program vary and have not yet reached the required level of development and lack of student knowledge and experience. Based on this condition, the type of inquiry chosen in the guiding development of this practicum is guided inquiry. In guided inquiry learning the lecturer does not fully release the activities carried out to the student, but the lecturer gives a directing question either expressed directly or through the questions given in the practical guide so that students are able to find their own direction and actions to solve problems given by the lecturer. Guided inquiry is a model of inquiry learning in which the teacher provides extensive guidance or guidance to students (Agung, 2009) and guided inquiry provides more direction for students who are not ready to solve problems with inquiry without assistance due to lack of experience and knowledge or not yet reached the level of cognitive development needed (Gormally, Brickman and Peggy, 2011 in Mulya, Saputro and Nugroho, 2016).

The choice of the guided inquiry approach also refers to some of the results of previous research. Arifah, Maftkhin, and Farmaryanti (2014) found that guided inquiry-based practical manuals for optimizing hand on Muhammadiyah Purworejo University Physics students in the 2013/2014 academic year effectively optimized student hand-on ability quite well, the guides were responded well by students and the implementation went well. Nurhidayah, Rahayu and Martuti's research (2014) found that Student Worksheets with a guided inquiry approach on environmental management materials at 23 Purwokerto Junior High School

students were effective in achieving student mastery learning very well, improving student activities and student process skills and LKS responded well by students. Fatmasary and Supriyanto's research (2015) found that practicum worksheets from the guided inquiry digestive process based on guided inquiry, effectively improve critical thinking skills and realize the mastery of learning in Ta'alumul Huda Bumiayu Islamic High School students. Furthermore, the research of Selvina, Susanti, and Iswari (2016) found that guided inquiry-based worksheets on the material structure and function of plant tissue in SMP effectively activated students, realized classical learning completeness and increased the effective value of students of Semarang N 11 Middle School.

Before the use of a practicum guide in the lecture process it is necessary to conduct a feasibility test of the practicum guide developed, so based on this validation has been carried out on Animal Physiology practicum guides developed by several expert lecturers, including material experts, languages, strategies and learning media. This validation aims to produce a practical guide that is valid and can motivate students to be active and independent in understanding and constructing concepts from practiced material.

II. RESEARCH METHODS

This study uses a Four-D development model developed by Thiagarajan, Semmel, and Semmel (1974). The 4-D model consists of 4 development stages, namely Define, Design, Develop and Disseminate or adapted to 4-P, namely, defining, designing, developing, distributing (Trianto, 2012: 93). This research has been carried out until

the development stage and the activities carried out at this stage is validation by expert lecturers from the material aspects, language aspects and aspects of strategy and learning media. Determination of validator using purposive sampling method, which consists of two expert Animal Physiology lecturers (lecturer in Animal Physiology majoring in Biology FMIPA Andalas University and Biology department FMIPA UNP), one linguist and one strategist and learning media (lecturer STKIP PGRI Sumatera West).

Analysis of practicum guide validity using the formula from Purwanto (2009).

$$\text{Validity Value} = \frac{\text{number of scores obtained}}{\text{highest number of scores}} \times 100\%$$

The validity criteria used to refer to Purwanto (2009), namely:

- 90 -100% = very valid
- 80 - 89% = valid
- 65 -79% = quite valid
- 55-64% = less valid
- ≤ 54 = invalid

III. RESULTS AND DISCUSSION

A. Results

The results of the practical guideline validation guided inquiry approach in the Animal Physiology subject by the validator are presented in Table 1.

Table 1. The Validity of Oriented Practical Guides Guided Inquiry Approach to Subject of Animal Physiology from Each Validator

No	Rating Aspect	Validator				Total	Validity Value (%)	Criteria	
		1	2	3	4				
1	Characteristic	11	11	11	11	44	100,00	Very Valid	
2	Quality Elements	9	12	12	12	45	93,80	Very Valid	
3	Language	3	5	5	5	18	90,00	Very Valid	
4	Stage of Guided Inquiry	8	8	8	8	32	100,00	Very Valid	
Total		31	36	36	36		383,8		
Average of Validity								95,95	

B. Discussion

The results of the validity test data analysis guided inquiry-oriented practical guide on Animal Physiology courses produced were declared valid in terms of

characteristics, quality elements, linguistic and guided inquiry stages with an average validity of 95.95% (Table 1), so the practicum guide was oriented the guided inquiry approach in Animal Physiology courses can be used for

practicing Animal Physiology in the Biology Education program of STKIP PGRI West Sumatra. This shows that the practicum guide developed has fulfilled the requirements for the preparation of good teaching materials and has fulfilled the criteria and development goals, including the presentation of practical material with complete description, organization of systematic material, conformity of the material with practicum material, harmony the format, work instructions, images and colors used have been integrated with inquiry syntaxes and have used the correct language rules, making it easier for students to use and understand practical guides. In accordance with Arikunto (2005) stated that if a data produced by a product is valid, it can be said that the product developed has provided an overview of the purpose of development correctly and in accordance with the actual reality.

Viewed from the characteristic aspect, this practicum guide was declared valid by the validator, namely 100% (Table 1). This criterion is obtained because the practicum guides produced already have characteristics in accordance with what students need, including material, illustrations, formatting, information, work instructions, learning experiences and practice questions from the practice guideline that has been developed to realize the learning outcomes of study programs and courses, directing, guiding and training students to work independently, adaptive to the development of knowledge, technology and competencies needed by students, improving the ability of collaboration and togetherness of students and students' skills in understanding concepts through process or treatment, so that students can build knowledge, gain experience in identifying problems, solving problems through self-designed procedures, modifying processes in accordance with reality, implementing results of activities in real life and evaluating the achievement of results independently. This is in accordance with what was stated by Rustaman (2003) that the practicum guide should be designed so that students have the opportunity to build their knowledge, gain experience in identifying real perceived problems, formulate operations, design the best procedures to solve problems and implement them and analyze and evaluate the results.

From the aspect of the quality element, there was a validity value of 93.80% with very valid criteria (Table 1). This is because the guideline developed has a proportional format and in accordance with the requirements of a good guide, including the format and size of columns, paper, letters and proportional and consistent spaces, proportional and efficient empty space placement, organized content and arrangement of materials well and systematically, the

combination of pictures, colors, types and sizes of matching letters, and systematic writing and typing layout are consistent, so that it attracts and makes it easier for students to use and understand practical guides. As Rustaman (2003) stated that a good practicum guide format must be well designed from paper size, letters and drawings and procedures need not be given clearly in writing but in the form of a pictorial or chart, the tools and materials used do not need to be clearly specified, so that students are given the opportunity to develop experimental planning skills, determine materials and assemble their own tools used.

From the language aspect, the results of validity were 90.0% with very valid criteria. This is because the practical guide developed has used the language in accordance with the rules of language that is correct and good, including the words used are easy to read, information is presented in effective and efficient language so that the practical guide is easy to use and understood by students and can be a reference which guides students to understand concepts and solve problems through practical activities independently.

From the aspect of guided inquiry stage, the results of 100.0% validity were obtained (Table 1) with very valid criteria. This is because the practical guideline format has integrated the syntax of inquiry as a whole and coherently. The stages of inquiry include 1) presenting problems, 2) formulating problems, 3) formulating hypotheses, 4) testing hypotheses, 5) collecting data, 6) analyzing data and 7) making conclusions (Eggen and Kauchak in Halim, 2010).

Practical guiding formats can improve students' ability to understand concepts better, increase student productivity in creative and independent thinking and students become skilled in obtaining and analyzing information. This shows that the practical guide developed has been able to realize the benefits of using the inquiry model in the learning process. The advantages of the inquiry model are 1) students can understand the concept better, 2) help use memory in the new learning process situation, 3) help students to think and work on their own initiative, be objective, honest and open, 4) teaching becomes student-centered, 5) can develop students' individual talents and 6) give students the freedom to learn independently (Muslim, 2011).

The presentation of the problem uses discourse that is designed by giving a simple problem in accordance with the phenomena and facts that occur in the surrounding environment so that it can assist students in identifying problems independently. To address the problem, the lecturer must provide a problem that is not discussed in the text and explain in other ways to approach the solution and

the problem is proposed without providing methods and provide phenomena that are designed to stimulate students to identify problems independently (Schwab in Fadiawati, 2006).

The formulation of the problem is presented by the lecturer based on the information and phenomena presented in the discourse. This can be a guide or guidance for students in defining problems and making hypotheses on the problems posed by lecturers independently, thus students can further develop ways of thinking scientifically and creatively in solving problems so that students are really placed as subjects of learning and lecturers only acting as a facilitator. This is consistent with Dewey's statement, 1938 in (Syam and Dede, 2007) that the inquiry process is a dialectical relationship between lecturers and students. The use of problems is very important and is the main characteristic of the inquiry learning process because the lecturer needs to design a problem systematically to help students think inductively or deductively.

The work steps presented in the practical guide are written in the form of simple, informative and communicative tips, so as to be able to guide students to select materials and tools and carry out these work steps skillfully, thus students will be skilled in conducting investigations in the form of experimental skills. and make observations to find physiological concepts. For hypothesis testing, students must have the skills to observe, measure to the highest ability, namely the ability to experiment (Andriani et al., 2011).

Supporting theories presented in the practical guide are complete and representative and relevant to the topics practiced. This can help students in collecting data or information to test hypotheses that have been formulated. The practical guide is equipped with a systematic and informative data presentation column, so students will be easy to analyze and interpret the data obtained, and draw conclusions from the data. An important stage of drawing conclusions is connecting various clues and facts of information with the knowledge that has been possessed to make a prediction of the final results formulated (Measawet, 2011).

In general, the practicum guide developed has met the development criteria and general objectives of learning with the inquiry approach. Inquiry learning helps students develop the skills needed to raise questions that arise from curiosity and attempts to find answers (Joyce in Sopiha *et al.*, 2009).

IV. CONCLUSION

The developed Animal Physiology practicum guide has been valid and feasible to be used as a guide in the implementation of practical activities of students of the Biology Education study program at STKIP PGRI West Sumatra. To see the practicality and effectiveness of its use both by students and lecturers, it is necessary to do research on the practicality and effectiveness of practical guides.

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