

# Development of Animal Physiology Practical Guidance Oriented Guided Inquiry for Student of Biology Department

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**Abstract.** The guides used for practicing animal physiology need to be revised and adapted to the lecture material. This is because in the subject of Animal Physiology. The guidance of animal physiology practitioners is still conventional with prescription model instructions and is so simple that it is necessary to develop a practical guide that can lead to the development of scientific work. . One of which is through practice guided inquiry guided practicum guide. This study aims to describe the process development of the practical guidance and reveal the validity, practicality, and effectiveness Guidance Physiology Animals guided inquiry inferior to the subject of Animal Physiology for students Biology Department State University of Padang. This type of research is development research. This development research uses the Plomp model. Stages performed are problem identification and analysis stage, prototype development and prototyping stage, and assessment phase. Data analysis using descriptive analysis. The instrument of data collection using validation and practical questionnaires, competence and affective field of competence observation and psychomotor and cognitive domain competence test. The result of this research shows that guidance of Inquiry Guided Initiative Guided Physiology with 3.23 valid category, practicality by lecturer with value 3.30 practical category, student with value 3.37 practical criterion. Affective effectiveness test with 93,00% criterion is very effective, psychomotor aspect 89,50% with very effective criteria and cognitive domain with value of 67, pass criterion. The conclusion of this research is Guided Inquiry Student Guided Protoxial Guidance For Students stated valid, practical and effective.

## 1. Introduction

The learning process that takes place at Universitas Negeri Padang, students are provided lectures by several subject groups such as: Personality Development Course, Scientific and Skills Course, Working Matter, Work Behavior Study, Joint Learning Lecture. [1]

In the Department of Biology, State University of Padang, which must be followed by biology students one of them is the subject of Animal Physiology which also holds practicum activities in the learning process. Through practicum activities, learners are directly exposed to real symptoms related to the concept of learning, both natural conditions and conditions manipulated through experiments. With the development of learning through practical work, learners are directly faced with concrete symptoms associated with the concept of learning so that the concept of learning will be more easily digested and understood [2].

Based on the results of observations that researchers do through the dissemination of student response questionnaires on September 16, 2016 at Bung Hatta University, September 21, 2016 at the



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State University of Padang and questionnaire responses lecturer on the implementation of physiology of animals on September 30, 2016 at State University of Padang there are several problems in implementation of the lab. From the results of these observations found several problems such as the following:

1. The guides used for practicing animal physiology need to be revised and adapted to the lecture material
2. Guidance Animal Physiology lab used is still conventional models with manual recipe (*cooking book type*). One of the advantages of guiding animal physiology that is still conventional and still shaped simple is in its use easy to understand. But on the other hand this is also one of the weaknesses of the guide physiology of the Animal because it is simple so not yet fully able to develop student scientific work
3. Laboratory Guides of Animal Physiology which is still conventional is less interesting for students so that the students are less interested in its use because the guide design used is still simple without any supporting pictures.

There are three approaches used in the method of inquiry: guided inquiry, free inquiry and free modification inquiry [3]. Approach according to the result of student requirement analysis to guide is guided inquiry because at that approach there are steps in presenting question / problem, making hypothesis, designing experiment, doing experiment to get information, Collecting data and Making conclusion according to student desire. This is supported by the research conducted [4] on the development of guidance for general biology guidance based on guided inkuri for students of biology education program STKIP ABDI Pendidikan Payakumbuh. The results showed that students who used guided guides oriented with guided inkuri were able to present problem formulation, hypothesis formulation, plotting experiments, conducting experiments, collecting data, analyzing data and drawing conclusions. Based on the background of the problem, it is necessary to develop a practical guide that can lead the students in designing practicum activities and developing scientific work.

## 2. Research Methods

This type of research used in this research is the development of research (*Research and Development*). *Plomp* development model, stages of research consists of the initial investigation phase (*preliminary research phase*), stage of development or manufacture of prototypes (*development or prototyping phase*) and a stage of assessment (*assessment phase*). The *Plomp* development procedure has three stages. The details of the development procedure include the following steps.

### 1. Preliminary Research Phase (Phase Problem Identification and Analysis)

Activities undertaken at this stage are curriculum analysis, student analysis and practical guidance analysis.

### 2. Development or Prototyping Phase (Phase Development and Prototyping)

The results of the *prototype* design at an early stage with a *prototype* called 1 evaluated by an evaluation (*self-evaluation*) using the checklist. That is to revise itself guides that have been designed. *Prototype 2* is a development stage by consulting with experts (*expert review*). Revision of *prototype 2* is based on expert judgment (validator). Quality criteria that want to get at this stage that is relevance, consistency and have practicality as expected. The products have been valid from the revised *prototype 2*, further evaluation of the single (*one-to-one evaluation*). At this stage a one-to-one evaluation is performed on three students with different levels of ability (low, medium and high ability). Evaluation done at this stage using interview sheet with students. Criteria to be achieved in this activity that is product practicality. The products have been tested through the evaluation of single (*one-to-one evaluations*), carried out the next stage of the test the practicalities of a small group (*small group*). At this stage, the evaluation of 6 students with the ability of low, medium, high composed of three groups, each consisting of 2 students. Revision 4 *prototype* is based on a small group then continued on the stage of the *assessment phase* (assessment phase) to perform field trials.

### 3. Assessment Phase (Phase Assessment)

The development stage that has been carried out is followed by a large group test of one class to see the prototype's practicality and effectiveness. Practicality is done by filling out a questionnaire of practicality response by lecturers and students.

The subjects of this study were Biology students of FMIPA UNP who followed the Physiology of Animal Physiology Year 2016/2017 semester 4 (Four). The type of data in this study is the primary data because the data obtained directly through the provision of questionnaires practicality test, validity test, and effectiveness test. The effectiveness test data includes affective, psychomotor and student test results.

Instruments used in collecting data in this study is a questionnaire validation practice guide by experts (expert), a questionnaire practicality practicum questionnaire filled by lecturers pengampu and guidance counselor subjects animal physiology, questionnaire effectiveness of affective observation sheet, student psychomotor and test for cognitive aspects.

The data collected from this research is the result of validation guidance of Animal Physiology based on guided inquiry approach. Validation results were analyzed using descriptive statistics. Scans for each use are provided under the following conditions [2].

Value 4 = Very Match (SS)

Value 3 = Match (S)

Value 2 = Not Match (TS)

Value 1 = Very Unsuitable (STS)

Of all items given, then tabulated and searched average by using the formula:

$$R = \frac{\sum_{i=1}^n Vi}{n} \quad (1)$$

Information

R = Average result of validator assessment

Vi = The score of the i validator's score

n = Many validators

### 3. Results and Discussion

#### A. Research Results

##### 1. Preliminary Research (Phase Problem Identification and Analysis)

###### a. Analysis curriculum.

The results of the curriculum analysis are obtained from adjusting the practicum activities to the guidance developed in the order of the semester lectures. It is intended that after students study the theory of animal physiology lectures can carry out practicum in accordance with the material that has been studied previously. In conducting curriculum analysis, it is found that there is a match between learning achievement that has been developed in accordance with the demands of Indonesia National Qualification Framework (KKNI).

###### b. Analysis of Students.

The result of the student's analysis is the students want the practicum guide who has the picture in accordance with the material to be practiced in order to assist the students in understanding the practicum. Students also agree if the guides developed are equipped with guides who have guided inquiry approach that can help students to develop a scientific attitude.

###### c. Practical Guidance Analysis

The result of guidance analysis is guidance of animal physiology practicum used in practicum need to be revised to fit the syllabus in animal physiology lecture.

##### 2. Phase Making Prototype (prototype phase)

This stage begins after the initial phase of the investigation (preliminary research phase) is completed. This stage consists of several stages of prototyping as follows:

###### a. Development of Prototype I

After doing curriculum analysis, student analysis and guidance analysis, the next step is to develop guidance guide of guided inquiry in guided animal physiology according to students' need.

### *b. Development of Prototype 2*

Prototype 2 is a development stage by consulting with experts (*expert review*). At this stage the instrument validation and validation of the practicum guide by the expert (lecturer) in order to produce a valid lab work guide.

#### 1. Results of Validation of Research Instruments

The instrument used in the study has a very valid category. This means that the validation practicum test instrument, practical test, and the effectiveness of the practicum guide are highly valid for use in the study.

#### 2. Practical Guidance Validation Results

At this stage, the expert lecturers are asked to assess the guides for the practicum that has been developed. The validation of the practicum guide includes didactic, constructive, technical and linguistic requirements. Data from the validation result of practicum guide can be seen in Table 1.

**Table 1.** Practical Guidance Validation Results

| No | Assessment criteria | Average Score | Criteria   |
|----|---------------------|---------------|------------|
| 1  | Didactic            | 3.12          | Valid      |
| 2  | Construction        | 3.44          | Very valid |
| 3  | Technique           | 3.36          | Valid      |
| 4  | Language            | 3.00          | Valid      |
|    | Average             | 3.23          | Very Valid |

Based on the overall average of validation results of 3.23 practice labs with very valid categories.

## **B. Discussion**

### *1. Initial Investigation Stage (Preliminary Investigation)*

The curriculum analysis aims to look at the subject matter in the subject of animal physiology. This analysis serves as a basis for formulating indicators and objectives of practicum activities and concepts into guided inquiry guided inquiry guides developed. This is supported by [5] which suggests that the curriculum is a guideline for the conduct of teaching and learning activities.

The guidance developed was revised in accordance with the lecture semester course design of animal physiology that is to adjust the order of the practicum in accordance with the sequence of material material of animal physiology lecture. In the guides used also do not fully load the material practicum for animal physiology such as the existence of the physiological anatomy lab activities in animal physiology guides used for lab work.

Analysis is done next is student analysis, student analysis is done by observation by spreading the questionnaire needs of students to know the needs of students to guide that will be developed. This analysis also aims to recognize the characteristics of students and see the needs of students on the guide that will be used in practical activities. This is in accordance with the opinion [5] which states it is important to know and understand the students carefully so that the teacher can carefully determine the materials to be provided, use matching teaching procedures, make a diagnosis of learning difficulties. From the results of student analysis also found problems that students want a guide that has a supporting image that can help improve students understanding during the lab.

Guidance analysis The guidance of animal physiology has been found that the practicum guide has not had an approach. In the absence of approach on guidance of animal physiology practicum, students' skill in lab activities is not maximal. The approach is used to find solutions to the limitations of learning. So the animal physiology guides should be equipped with an approach that can develop student skills during the practicum process and the approach used is the inquiry approach. This is supported by [6] who argue that inquiry approach is a learning approach that directs students to find knowledge, ideas and information through their own efforts. the keyword of the inquiry approach is to find itself. the inquiry approach has a working stage, as experts use this approach in conducting experiments. So because the inquiry approach is used by experts for experiments, this approach is also suitable for practicum because in practicum activity, praktikan is led to be able to find the answer from

a problem by doing an experiment. It is also supported by the [7] which states approach the *guided inquiry* learning constructivist homage that emphasizes activity into learning, the constructivist learning more students can develop its problem-solving ability. This opinion is also supported by research that has been done by [8] which states after using guided inquiry approach, student activity in the learning process is increasing active.

With the discovery of several problems at the stage of identification and initial analysis it is necessary to develop a practical guide that can develop students' scientific skills during the process lab.

## 2. *Stage Prototyping (prototype phase)*

Based on the analysis of the evaluation evaluation itself, it is found that the guided practicum guide has met the criteria on didactic, constructive, technical, and language requirements. From the results of this self-evaluation, the authors make improvements in the form of adding material related to the practice in the guides developed.

After a further revised product development phase conducted by consulting with experts (*exper review*). Prior to product validation, instrument validation was performed. Validated instruments are in very valid criteria. This means the instrument is valid and usable. After the instrument has been validated, the validation will be done to the practical guide to determine the feasibility of the guides that have been developed. This is supported by [9] which states that Kevalidan was obtained by seeking expert consideration. The practicum guide is stated to be very valid because it has fulfilled four aspects of didactic, construct, technical and language aspects based on the validation result done by the validator.

Overall on the didactic aspect validated by the validator declared valid by the validator lecturer. This means that the guidance that has been developed has fulfilled the requirements for the preparation of a good practicum guide, such as the suitability of the curriculum, syllabus and learning achievements and the material can provide information related to practical activities.

The construct aspect validated by the validator is declared very valid by the validator lecturer. This indicates that the guides developed for guidance developed have fulfilled the requirements for the preparation of good practicum guides, such as the guidance of practicum already having clear rules and procedures for the students. Have instructions for use for lecturers and students. The practicum guide already has a suitability between the objectives of the practicum activity with the learning achievement, the practicum activities performed in accordance with the syllabus, has clear rules and rules in the laboratory, consistency using symbols / symbols, and the guides developed are oriented inquiry and guided inquiry the inquiry stages are guided.

The next aspect is the technical aspect validated by the validator lecturer stated very valid. This means that the developed guide has been valid in terms of writing, drawing and graphics. The writing on the developed guide has used the type and size of letters that are clearly read. Images that are on the cover (*cover*) is a portrait of the contents of the guide and symbols can distinguish the procedures at each step in guided inquiry. colors on each symbol the used has been varied and interesting, and the colors on the guides can make the students interested.

Aspects of language validated by the validator lecturer, obtained valid criteria. This guideline developed has qualified the preparation of a good practice guide, such as language is already communicative, not double meaning, and is a language that is good and correct according to Indonesian rules.

## 4. Conclusions

Based on the development and trial of the practicum guide that has been done, obtained the following conclusions.

1. The process of developing practical guidance Physiology oriented guided inquiry through the stages of problem identification and analysis (*preliminary research*), stage of development and manufacture of prototypes (*development or prototyping phase*), and the stage of assessment (*assessment phase*).

2. Animal Physiology lab guiding oriented guided inquiry that has been developed to have the validity of the category of very valid.

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