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Validity of Vertebrate Taxonomic Practicum Guide Based on Science Process Skills Equipped by Identification Key for Students

Holyza Handika[1(*)], Abdul Razak[1], Dwi Hilda Putri[1]

[1]*Biology Department, Faculty of Mathematics and Science Faculty, Universitas Negeri Padang, Indonesia*
[*]*Corresponding author. Email: holy.handika@yahoo.co.id*

ABSTRACT
The development of a practicum guide based on science process skills that is equipped with the identification key is expected to increase the students' reasoning power and the ability to identify. Science process skill is learning strategies that can improve students' skills which is not only focused on the result but also prioritizes on how students obtain the knowledge. The aim of this study is to produce a valid practicum guide. The validity of the practicum guide was based on the validation sheet. Aspects that were assessed consisting of aspects of content, language, presentation, and graphics. The type of research was developmental research using Plomp model consisting of preliminary research stages, prototyping and assessment. The subjects of this study were 23 students and lecturer. The results of this study indicated that the aspect of content was 85.86% which is categorized valid, the aspect of language was 77.08% which is categorized valid, the aspect of presentation was 88.33% which is categorized valid, the graphic aspect was 84.38% which is categorized valid, and the average percentage of these aspects was 84.50% which was also categorized in valid criteria. Therefore, the practicum guide developed is proper to use because it meets the criteria for validity.

Keywords: *validity, Practicum Guide, Vertebrate Taxonomy, Science Process Skil, Identification Key*

1. INTRODUCTION

Vertebrate taxonomy is a course that brings students to understand the scientific process based on theories, concepts, basic principles of taxonomy. This course is a branch of science process which is in acquiring its knowledge requires a series of systematic and empirical activities. Therefore in vertebrate taxonomy learning, practicum has a very important position to support the theory that has been studied. [1] stated that practicum activities are very important because they can increase the motivation to learn science since it provides opportunities for students to fulfil their curiosity. [2] added that practicum activities have an important role in improving learning outcomes and shaping students' scientific attitudes.

Based on the results of the writer interview with several vertebrate taxonomy lecturers in several universities, several problems were found including the difficulty of taxonomy vertebrate learning, where students had difficulty in memorizing Latin, did not know how to identify organism, the practicum guide format that tends to be monotonous and the limited objects that can be practiced. This had proven from the results of the writer's interviews with biology students who say that the existing practicum guide has not fully been able to develop student science process skills that include observing, classifying, interpreting, concluding, and communicating. 70% of them said that the existing practicum guide was not helpful yet in carrying out practicum activities. According to the result of the interview, students said that the pre-existing practicum guide had not helped them in the activity: observing (60% said not), classifying (75% said not), interpreting (55% said not), concluding (70% said not) and communicating (75% said not). This kind of situation indicated that the science process skills that had expected when practicum activities were not yet visible. This was consistent with the opinion of Kanter (2003) which stated that a monotonous practicum guide has not been optimal in developing science process skills and the reasoning power of students.

Responding to this problem, it is necessary to develop a vertebrate taxonomic practicum guide in order to support the understanding and identification skills of students in practicum activities. The development of practicum guides is done by including a scientific process skills (KPS) approach, which is not only focused on the results but also on the process through observing, classifying, interpreting, communicating and concluding.

[3] stated that the past few decades educators in the field of science have focused on the PPP approach. Science process skill (KPS) is a learning approach that develops student process skills in regular and systematic learning activities through simple research, experiment and a number of other practical activities. This is in accordance

with [4] who stated that science process skill is cognitive and psychomotor skills used in problem-solving, practicum will train science process skills in identifying problems, investigating, collecting the data, practical working, and assessing separately.

To find out whether the practicum guide that was developed was appropriate or not, then several tests were needed. One of these tests is the validity test. Validity relates to the ability to measure precisely what is needed to be measured [5]. Validity test is conducted to find out the validity of the practicum guide used. The practicum guide is valid if it can measure what is needed and accurately reveal the data from variables. therefore, it is necessary to validate the practicum guide based Science Process skill which is equipped by an Identification Key in order to support the student learning process.

2. REVIEW

2.1. Theoretical Review

2.1.1 Validation

Nieveen in [6] suggested that the general criteria for obtaining high-quality interventions can be done by determining the value of validity. Validity relates to the ability to measure precisely what needs to be measured [5]. Validity refers to the validity of the content or what is also called as relevance and validity of the construct which is also called consistency. Content validity (relevance) is based on the need for an intervention and in its design is based on knowledge. Construct validity refers to the components of various interventions that related to each other.

According to [7], validity consists of logical and empirical validity. Logical validity shows the conditions for a teaching material that fulfills requirements of validity based on the results of reasoning, while empirical validity is when it has tested of the experience. This is in accordance with the Ministry of National Education [8] which states that component of the evaluation includes the content, language, presentation, and graphical feasibility components.

2.1.2 Practicum Guidance

[9] revealed that the practical guide is a tool to achieve learning goals and encourage students to be more active. National Education Decree Number 36/D/2001 states that practicum guide is a guideline for practicum activities which contains procedures, preparation, implementation, data analysis, and reporting.

Writing a book of practicum guide must fulfill a standard writing principle because the guide will be used by students to carry out the practicum in the laboratory thus the basic competencies, indicators and practical objectives can be fulfilled.

2.1.3 Science Process Skill

Science process skill (KPS) is a learning approach that develops students process skills in regular and systematic learning activities through simple research, experiment and a number of other practical activities. PPP involves cognitive or intellectual, attitude, and psychomotor skills[8]. Through KPS, students will gain learning experience because they are actively involved in learning. This is consistent with Shaibu (2003) that, the PPP approach is very effective in improving students' formal reasoning and relative to the lecture method.

[10] stated that science process skills can be divided into two, namely: basic skills and integrated skills. Integrated science process skills in the form of investigative skills as an advanced science process skills.

In KPS, there are steps that can guide students to have good job processing skills. [11] said that an integrated practicum guide has the application of science process skills activities (observing, classifying, interpreting, asking questions, hypothesizing, experimenting, applying concepts, and communicating).

2.2. Research Methodology

This type of research is development research (design research). Product developed is in the form of vertebrate taxonomy practicum guide based on science process skill that is equipped by identification key for students.

The model used in developing is the Plomp model. This model consists of three stages: the initial investigation/problem identification phase (preliminary research phase), the prototyping phase and the assessment phase.

The preliminary research phase includes needs analysis, interviews with vertebrate taxonomy practicum lecturers / lecturers, practicum guiding analysis, and student analysis. Furthermore, the prototyping phase aims to design problem solving that has been identified in the initial investigation phase. At this stage compile solution and components of the practicum guide was done to produce a prototype. At this stage, the practicum guide that has been arranged was realized to be a practical guide that was still in the form of a prototype 1. Prototype 1 was carried out a Self-evaluation test to complete the practical guide component. Based on the Self-evaluation test, a revision was made and a prototype was produced 2. Then the assessment phase was carried out. The prototype was validated by validators who were experts in their field.

Validation was carried out by four experts using a validity instrument in the form of a questionnaire. Furthermore, revisions were made based on suggestions and responses from the experts thus the practical guide met the criteria of validity and could be used by students in vertebrate taxonomic practicum activities. Analysis of the validity of the practicum guide in the form of eligibility requirements, language, presentation, and graphic practicum guide.

The data obtained from this study were the result of the validation of the vertebrate taxonomic practicum guide. Determination of score answers based on Likert Scale criteria adapted by [12], as follows.

4 = Strongly agree (SS)
3 = Agree (S)
2 = Disagree (TS)
1 = Strongly disagree (STS)

After that, determining the value of validity by using the formula below:

$$\text{Validity Value} = \frac{\text{Total of obtained score}}{\text{Total of Highest Score}} x\ 100\ \% \quad (1)$$

After obtaining the value of validity using the formula above, then giving an assessment of the validity with the modified criteria from Riduwan (2009) below.

81 - 100% = very valid
61 - 80% = valid
41 - 60% = quite valid
21 - 40% = less valid
0 - 20% = invalid

The vertebrate taxonomy practicum guide is declared valid if it meets the valid and very valid criteria.

3. RESULT

In the initial investigation phase, syllabus analysis, student problems analysis in taxonomy lectures, and students need analysis were carried out. Problem analysis aimed to identify problems faced by students during the vertebrate taxonomic lectures. Students need analysis that has been done obtained results that 70% of students wanted a practical guide equipped by an approach, 80% of students agreed that in the practical guide there was an identification key to facilitate the understanding in identifying, and 100% of students wanted a colored module. Students were more likely to like bright colors like blue, pink, green, and yellow.

The next step was the syllabus analysis. This analysis also aimed to find out and formulate the accuracy and suitability of the material with the curriculum, the truth of the concept, the completeness of the guide components, the type of approach and the language used in the vertebrate taxonomic practicum activities.

After doing some of the analysis above, the next step was designing a practicum guide. Presentation of practicum guides in the form of printed teaching materials was made by using Microsoft Office Publisher 2010. Material studies were written by using Andalus writing type with size 12. Each chapter was given an introductory cover thus it described the material to be studied. The practicum guide was designed by incorporating the scientific process skills (KPS) approach to help to improve the reasoning skill and improve the science skills of the students. Besides that this practical guide was also equipped with identification keys that were useful to improve understanding and facilitate students in identifying vertebrate animals.

The practicum guide based KPS has been designed, then the self-evaluation phase (self-evaluation) was used to check the errors that might be found in the practical guide thus the practical guide given to the validator was better than the initial design. The revised practicum guide would be continued to the next step.

At the next step, the practicum guide was validated by the lecturer as the expert validator. The practical guide was validated by several experts. Practical guide validity included aspects of content, presentation, language, and graphics. The validators in this process of validity were Mr. Dr. Darmansyah, ST. M.Pd, Mr. Dr. Abdurrahman, M.Pd, Mr. Dr. Ramadhan Sumarmin, M.Si, and Mr. Drs. Nurhadi. M.Sc. beside giving an assessment on the validation sheet provided, the validators also provided suggestions for improvements to the practicum guide that has been designed. Analysis of the results of validation by the expert could be seen in Table 1 as follows.

Table 1. Analysis of questionnaire validation results.

Aspects	Validity value (%)	Criteria
Content	85,86	very valid
Presentation	83,33	very valid
language	77,08	very valid
Grphic	84,38	very valid
Amount value/total value	82,66	very valid

The results of validation from the four aspects based on the analysis table of the practicum guideline validation results by the experts which include aspects of content, presentation, language, and graphics showed an average score of 82.66% with a very valid category. These results indicated that the practicum guide developed can be used in learning.

4. DISCUSSION

The assessment of the four validators against the developed practicum guide was stated to be very valid in terms of content, presentation, language, and graphics.

The aspect of content, practicum guide was stated to be very valid by the validator because it had been developed in accordance with Learning outcomes (LO) and LO indicators that were adjusted to KKNI. The material presented in the taxonomic practicum guide was clear and equipped with an identification key. Identification keys were given to make the students easier to classify the observed animals and help students to understand how to classify living things thus after practicum there were no more students who were unable to identify. In addition, very valid criteria for practicum guide from the aspect of content were also seen from the practicum guide framework that was in accordance with the criteria. According to [13] the practicum guide framework must be able to help students in scientific thinking, thus in the practicum guide, there are rules that need to be followed during the practicum activities, the existence of research questions, basic theories, hypotheses, observation sheets, and draw conclusions through group discussions.

The next aspect was the aspect of the presentation. The developed practicum guide that was considered to be very valid by the validator because the presentations of the practicum guide were equipped with pictures and information to facilitate students' understanding of the material being studied. The presentation of the vertebrate

taxonomic practicum guide was also presented using the scientific process skills (KPS) approach. According to [8] the KPS approach involves cognitive or intellectual, attitude, and psychomotor skills. KPS train students' learning process skills through psychomotor activities which are very suitable for students to develop their reasoning and competence. Learning also be more meaningful with the development of scientific attitudes, so that the cognitive, affective, and psychomotor aspects of students are fulfilled. This is in accordance with Hofstein and [11] who added that learning for students will not be meaningful if students do not practice or experience the process directly through observation or experiment conducted in the laboratory. This practicum guide was designed by presenting KPS indicators, such as observing, measuring, predicting, classifying, concluding, and communicating. These indicators were raised in the activities in the vertebrate taxonomic practicum guide in the form of practicum activities.

Aspects of language were stated very valid by the validator. Submission of the material in the practicum guide already used language that was easy to understand and has followed the good and correct Indonesian language rules.

The next aspect was the aspect of graphics. This aspect was considered to be very valid by the validator because the practical guide was equipped with an image accompanied by an explanation thus it was easier for students to understand the material being studied. Besides that, the practical guide also had colours that attracted the learning attention and did not interfere with the reader focus. The font size used had also met the criteria thus it can be read clearly by students.

5. CONCLUSION

In conclusion, the vertebrate taxonomic practicum guide had fulfilled valid criteria, therefore it can be used in learning activities as the teaching materials that can help students to improve their understanding and reasoning in vertebrate taxonomic practicum activities.

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