Journal homepage: http://jurnal.uinsu.ac.id/index.php/analytica

Journal Analytica Islamica

VALIDITY OF PROBLEM-BASED SCIENCE PRACTICAL INSTRUCTIONS

Irwandi Rahmat

[1] Universitas Negeri Makasar, Indonesia

*Corresponding Author: irwandi.rahmat@unm.ac.id

Article Info

Article history:

Received :
Revised :
Accepted :
Available online
http://jurnal.uinsu.ac.id/index.php/analytica

E-ISSN: 2541-5263
P-ISSN: 1411-4380

How to cite:
Rahmat, Irwandi (2024). *Validity of Problem-Based Science Practical Instructions for MTs Grade VIII Odd Semester.* 13 (2) (2024), 367-376

ABSTRACT

This research aims to test the level of validity of problem-based science practicum instructions aimed at class VIII SMP/MTs students in odd semesters. The problem-based approach was chosen because it was proven to be effective in improving students' critical thinking and problem solving skills. This research uses part of the 4D method which consists of definition, design and development. The results of this research show that the problem-based practicum instructions developed are valid, with a validity value of 4.2, which means that the problem-based practicum instructions are included in the valid criteria. It is hoped that the final product resulting from this research can be a reference for teachers in teaching science using a problem-based approach, so that it can improve the quality of science learning in schools.

Keywords: *Validity; Practical Instructions; Natural Sciences.*

ABSTRAK

Penelitian ini bertujuan untuk menguji Tingkat validitas petunjuk praktikum IPA berbasis masalah yang ditujukan untuk siswa kelas VIII MTs pada semester gasal. Pendekatan berbasis masalah dipilih karena terbukti efektif dalam meningkatkan kemampuan berpikir kritis dan pemecahan masalah siswa. Penelitian ini menggunakan bagian dari metode 4D yang terdiri dari Pendefenisia, Perancangan dan pengembangan, Hasil penelitian ini menunjukan bahwa petunjuk praktikum berbasis masalah yang dikembangkan bersifat valid, dengan Nilai kevalidan adalah 4,2 yang berarti bahwa petunjuk praktikum berbasis masalah termasuk dalam kriteria valid. Produk akhir yang dihasilkan dari penelitian ini diharapkan dapat menjadi referensi bagi guru dalam mengajar IPA dengan pendekatan berbasis masalah, sehingga dapat meninmgkatkan kualitas pembelajaran IPA di sekolah

Kata Kunci: Validitas, Petunjuk Praktikum, Ilmu Pengetahuan Alam.

1. INTRODUCTION

The first curriculum published by the government was the 1968 curriculum. This curriculum aims to establish the foundation of citizenship and statehood by instilling the Pancasila ideology. In this curriculum, the largest portion is moral and citizenship education and religious education. Meanwhile, science education has not received an adequate place (Sulisyowati & Wisudawati, 2005)

A few years later, a revision was made so that the 1975 curriculum was formed which tried to develop cognitive, psychomotor and affective aspects. So that science education or Natural Sciences (IPA) has become an important element, while English is only an additional lesson. Some time later, the 1985 Curriculum was formed which increased the implementation of the Active Student Learning Method (CBSA) which wanted the teacher's role as a facilitator and not dominate learning. Based on CBSA, science lessons should be carried out in the laboratory as a direct experience process and students are placed as learning subjects (Sulisyowati & Wisudawati, 2005).

This is because science is related to how to systematically find out about nature, so that science is not only the mastery of a collection of knowledge in the form of facts, concepts or principles but also a process of discovery. Science education is expected to be a vehicle for students to learn about themselves and the surrounding environment, as well as prospects for further development in applying it in everyday life. The learning process applies to providing direct experience to develop competencies in order to explore and understand the surrounding environment scientifically (Balitbang Diknas, 2006).

Science learning should be carried out through scientific inquiry to foster the ability to think, work and scientific attitudes and communicate them as important aspects of life skills. Therefore, science learning in junior high schools/MTs emphasizes the provision of direct learning experiences through the use and development of process skills and scientific attitudes (Balitbang Diknas, 2006)

The development of process skills and scientific attitudes can support the abilities expected in the 21st century knowledge era, including problem-solving abilities and student creativity, so that at present various methods must be done so that the younger generation is able to have such abilities. One of the common ways is to implement learning that makes students independent, for example in practical activities at school.

The reality of the learning concept that occurs in science learning, which is more focused on products by utilizing concepts and theories. This situation is worsened by learning that is oriented towards tests or exams. As a result, science as a process, attitude and application is not touched in learning. The learning experience obtained is not complete and is not oriented towards creating competency standards and basic competencies. Teachers only convey science as a product while students only receive factual information. Students only study science at a low cognitive dominant.

Based on the results of observations conducted by interviewing teachers and students at MTs Negeri 1 Libureng, Bone Regency, which showed that students who were developed through learning activities had not yet touched on the affective and psychomotor aspects. Science learning at the school rarely carries out practical activities, usually only once a semester due to the lack of teacher knowledge about practical activities and the unavailability of practical activity instructions regarding material that can be practiced so that they only do science learning in class so that students sometimes feel bored.

Practical activities that are usually carried out once a semester are only taken from one of the science textbooks used by the school. Practical instructions in the LKS and existing modules contain rigid steps that must be taken by students so that they are not creative and still feel confused about the activities carried out. In addition, the existing practical instructions only test the theory, while the practical work is to solve students' real-world problems. This causes students to lack problem-solving skills. The knowledge gained cannot be used to solve problems faced in everyday life.

Based on the explanation above, the author plans to develop problem-based science practical instructions whose contents begin with brief material which is the orientation of the problem to be practiced and then the formulation of the problem that will later be solved by students through practical activities. The author's hope for the problem-based practical manual that will be created is to help develop creative thinking skills and problem-solving skills and help teachers in schools in implementing science practical activities.

2. RESEARCH METHODE

This research is Research and Development (R & D) or is research and development using the 4D model by Thiagarajan which consists of 4 steps, namely (1) Define, (2) Design, (3) Develop and Disseminate, or adapted from the 4-P Model, namely Defining, Designing, Developing and Disseminating, but with the limitations of the researcher, the development of this practical guide only reached the development stage, namely in the revision section of the limited trial results, where it is hoped that there will be other researchers who are able to continue the results of this development with the experimental method or PTK to find out more about the effectiveness of the problem-based practical guide that has been developed.

Research Implementation Procedure

This research uses a 4D model using 3 stages of research in the model, namely:

a. Define (Definition)

In the context of developing teaching materials (modules, books, LKS, etc.), the definition stage is carried out by:

1. Curriculum analysis

   In the initial stage, researchers need to review the curriculum in effect at that time. In the curriculum there are competencies to be achieved. Curriculum analysis is useful for determining which competencies the practical manual will be developed for. This is done because it is possible that not all competencies in the curriculum can be practiced.

2. Analysis of student characteristics

   Like a teacher who is going to teach, researchers must recognize the characteristics of students who will use the practical manual. This is important because all learning processes must be adjusted to the characteristics of students.

3. Material analysis

   Material analysis is done by identifying the main material that needs to be practiced, collecting and selecting suitable material, and reorganizing it systematically

4. Formulating objectives

   Before writing a practical manual, the learning objectives and competencies to be taught need to be formulated first. This is useful for limiting researchers from deviating from their original objectives when writing a practical manual.

b. Design

In the context of developing teaching materials, this stage is carried out to create a practical manual with a content framework from the results of curriculum and material analysis and to simulate the use of the practical manual that has been created in a small scope. Before the product design is continued to the next stage, the product design (practical manual) is then checked by colleagues and the supervising lecturer. Based on the results of the examination by colleagues and supervisors, it is possible that the product design still needs to be improved according to the suggestions.

c. Develop

Thiagarajan divides the development stage into two activities, namely: expert appraisal and developmental testing. Expert appraisal is a technique to validate or assess the feasibility of a product design. In this activity, an evaluation is carried out by experts in their fields. The suggestions given are used to improve the material and learning design that have been prepared. Developmental testing is an activity to test the product design on the actual target subjects. During this trial, data on responses, reactions or comments are sought from the targe t users of the practical manual. The results of the trial are used to improve the product.

In developing a practical manual, development activities are carried out with the following steps.

1) Validation of the practical manual by experts. The things that are validated include guidelines for using the model and learning model tools. The team of experts involved in the validation process consists of material experts and teaching material development experts.
2) Limited trial by testing the readability of the product on class VIII students of MTsN 1 Libureng
3) Revision of the practical manual based on the results of the trial

Data Collection Instruments

The entire instrument will be validated by three validators, namely two people as expert validators and one person acting as a practitioner validator. The data collection instruments used in this study are as follows:

1) Learning device validation sheet

   This validation sheet is a sheet made by the researcher and given to the validator to validate the questionnaire and problem-based practicum instructions. The purpose of this validation is to obtain the validity and practicality of the learning device.
2) Learning device practitioner sheet

   This practitioner sheet is a sheet made by the researcher and given to practitioners (science teachers) to assess the level of practicality of the problem-based practicum instructions.
3) Student response questionnaire instrument

   The student response questionnaire instrument is used to obtain data on students' opinions/responses to the problem-based practicum instructions developed.

Data Collection Techniques

According to Nieeven (Yamasari, 2010), a material is said to be good if it meets the quality aspects, including: (a) validity, (b) practicality, and (c) effectiveness. Validity is the level of validity of the measuring instrument used, practicality is an evaluation tool that places more emphasis on

the level of efficiency and effectiveness of the evaluation tool, effectiveness is a measure that states how far the target (quantity, quality and time) has been achieved.

According to Hobri (2009), based on the data from the results of the assessment of the validity of learning media from several experts, the average value of the indicators given by each validator is determined. Based on the average value of the indicator, the average value for each aspect is determined. The average value of the total aspects assessed is determined based on the average value for each aspect of the assessment.

The aspects assessed by the validator include: the suitability of the device with the Competency Standards, Basic Competencies, Indicators, accuracy of the materials, learning support materials, presentation techniques for learning devices, and completeness of presentation of learning devices.

Data Analysis Techniques

1) Techniques for measuring media validity by experts

According to Hobri (2009), based on data from the results of media validity assessments from several competent experts in the field of media development, the average value of the indicators given by each validator is determined. Based on the average value of the indicator, the average value for each aspect is determined. The average value of the total aspects assessed is determined based on the average for each aspect of the assessment. The activity of determining the average value of the total aspects of media validity assessment follows the steps to determine the Va value or the total average value of the average value for all aspects with the formula:

$$Va = \frac{\sum_{i=1}^{n} Ai}{n}$$

where, Va = total average value for all aspects,

Ai = average value for the i-th aspect,

n = number of aspects

The results obtained are then written in the appropriate column in the table. Furthermore, the Va value or total average value is referred to the interval for determining the level of validity of the practical instructions which can be seen in table 1 below.

Table 1. Interval for determining the level of product validity

Score interval	Validity Category
$1 \leq Va < 2$	invalid
$2 \leq Va < 3$	less valid
$3 \leq Va < 4$	quite valid
$4 \leq Va < 5$	Valid
$Va = 5$	very valid

The criteria state that the media has a good degree of validity, if the minimum level of validity achieved is a valid level. If the level of validity achieved is below valid, then a revision needs to be made based on input (correction) from the validator. Then re-validation is carried out. And so on until valid media is obtained (Hobri, 2009).

3. RESULT AND ANALYSIS

The development research that has been conducted refers to the 4-D development model. The results of the research implementation stages are as follows.

Define Stage

The results of the definition stage of the development of problem-based practical instructions are as follows.

Curriculum Analysis

From the results of the curriculum analysis, the following competencies are the targets for the development of practical instructions that are being developed, namely Understanding various systems in human life, Understanding systems in plant life and Understanding the use of ch emicals in everyday life

Material Analysis

The results of the analysis of problem-based practical instructions to determine the 1st semester science material that can be practiced. The materials selected are Growth and development, Movement system, Digestive system, Respiratory system, Circulatory system and, Structure and function of the plant body, Photosynthesis, Movement in plants, Pests and diseases in plants, Household chemicals and Addictive substances and psychotropic drugs.

Problem Analysis

The results of determining the formulation of the problem for each practical activity related to what will be achieved.

Design Stage

a. Map of Needs and Titles of Practical Instructions

The determination of the title of each practical unit in the practical instructions that have been developed can be seen in Table 3 below.

Table 2. Title of Problem-Based Practical Instructions

No	Materi	N	Title of the practical unit
1	Growth and development	1	Germination
2	Growth and development in humans	2	Human development stages
3	Movement system	3	Movement joints
4	Digestive system	4	Nutrition in food
5	Respiratory system	5	Human respiratory rate
6	Circulatory system	6	Blood vessels
		7	Blood type
7	Structure and function of the plant body	8	Monocotyl and dicotyl roots
		9	Organs in plants
8	Photosynthesis	10	Starch test on leaves
9	Movement in plants	11	Tropism movement
		12	Nasty movement

10	Plant pests and diseases	13	Pests and diseases in Plants
11	Household chemicals	14	
12	Addictive substances and psychotropics	15	Household chemicals

b. Components of Practical Instructions

The components of the problem-based practical instructions that have been developed can be seen in Table 4 below.

Table 3. Components of Problem-Based Practical Instructions

No	Practical Instructions Components
1	Brief material/ Problem orientation
2	Problem formulation
3	Practical objectives
4	Tools and materials
5	Working method
6	Evaluation questions
7	Conclusion

Development Stage

This stage aims to produce the final form of the product developed in the planning stage. There are three results of the development stage, namely: 1) Development of problem-based practical instructions, 2) Practical instructions products, 3) Product evaluation data, teacher and student response questionnaires.

a. Product Evaluation Data, Teacher and Student Response Questionnaires

The data obtained in this problem-based practical instruction development research consists of product evaluation data to test the validity of the practical instructions and teacher response questionnaire data to test the practicality of the practical instructions and student response results to test the effectiveness of the product.

1) Product evaluation data

Product evaluation test results data include product evaluation data from two expert lecturers, namely Dr. Muhiddin, M.Pd and Andi Rahmat Saleh S.Pd, M.Pd. This product evaluation data is to test the validity of the practical instructions. This evaluation data includes an assessment of the aspects of the suitability of the format of the practical instructions, aspects of the appropriateness of the content, aspects of language and writing which are converted into four categories, namely very valid, valid, less valid and invalid.

Validity Data Analysis

After obtaining the validation results from each aspect of the practical instructions, the average total of each aspect can be formulated and can be seen in Table 5 below.

Table 4. Validation Results for all aspects

No	Aspect	Validity value of each aspect	Average total validity (*Va*)
1	Format	4	
2	Content	4	

3	Language and writing	4,6	$Va = \frac{\sum_{i=1}^{n} Ai}{n}$
			4,2
			VALID

In testing the validity of the problem-based practical instructions product, through several improvements from the initial product made, these improvements are in accordance with the suggestions of the expert validator, including improvements to the cover which is still not attractive, the observation table which is still incomplete, the formulation of the problem which must be improved again and the use of language and writing which must be improved. After making improvements according to these suggestions, this problem-based practical instructions product is declared usable with minor revisions. Based on the results of the analysis of expert and practitioner assessment data as described in the presentation of the validation results, in general the developed practical instructions have met the validity criteria. In this case, it can be explained that the developed practical instructions have been based on a strong theoretical study and have internal consistency. This interpretation is based on the acquisition of data on the validity of the validated practical instructions which are in the interval $3 \leq VR \leq 4$, in the valid category.

Format Aspect of Practical Instructions

This aspect consists of sub-aspects (1) the title of the material represents the entire contents of the practical instructions, (2) the activity instructions are able to direct students in practical activities, (3) presenting the competencies to be achieved, (4) the suitability of supporting information in the form of a brief theory of tools and materials, working methods and concepts to be discussed in the practical instructions, (5) the suitability of the procedural steps of the activities that must be carried out by students with the concepts to be discussed in the practical instructions, and (6) the suitability of the presentation of questions with the activities carried out in accordance with the practical instructions.

For the first sub-aspect, the first validator gave a score of four, while the second validator gave a score of three, for the second and fourth sub-aspects, the first and second validators both gave a score of three. For the third sub-aspect, both validators gave a score of four. For sub-aspect five, the first validator gave a score of four while the second validator gave a score of two. And for the sixth sub-aspect, both expert validators gave a score of two. The average score for the practical instructions format aspect is 4 or valid.

Aspects of the contents of the practical instructions

Aspects of the contents of the practical instructions consist of sub-aspects (1) suitability of the indicators with what will be achieved, (2) truth of the concept or material, and (3) suitability of the material with the practical activities. For the first sub-aspect, the first validator gave a score of four while the second validator gave a score of two, for the second sub-aspect, the first validator gave a score of four while the second validator gave a score of three, and for the third sub-aspect, the first validator gave a score of four while the second validator gave a score of two. The average score for the content aspect of the practical instructions is 4 or valid.

Language and writing aspects

The language and writing aspects consist of sub-aspects (1) questions are formulated in simple language and do not cause double interpretation, (2) written using standard Indonesian language rules, and (3) using clear and easy-to-understand letters.

For the first sub-aspect, the first and second validators gave a score of four. The second sub-aspect, the first validator gave a score of four while the second validator gave a score of three. The third sub-aspect, the first validator gave a score of five while the second validator gave a score of four. The average score for the language and writing aspects is 5 or valid.

According to Arikunto (2010), validity is the level of validity of an instrument. A valid instrument is an instrument that is able to measure what should be measured. A valid or valid instrument has high validity. Conversely, an instrument that is less valid means it has low validity. The validity of problem-based practical instructions is tested at the stage of developing practical instructions. The stage of developing practical instructions is carried out in accordance with the design stage that has been made by the researcher. Validation of the practical instructions was carried out by 2 expert validators by directly viewing and assessing the practical instructions that had been made, then giving a value to the validation sheet instrument. Validation of problem-based practical instructions was carried out 2 times until good validity was obtained.

Based on the results of the analysis of the validity data of the problem-based practical instructions, the validity values obtained from two expert validators for each aspect of the assessment, namely the suitability of the format is 4; the appropriateness of the content is 4; language and writing are 4.6 So the average value of the validity of the problem-based practical instructions is 4.2 so it can be concluded that this value is included in the "Valid" category (4 V 5). The validity of the problem-based practical instructions is concluded to be included in the valid category because the problem-based practical instructions that have been made meet all aspects of the validity assessment, namely the aspects of format suitability, content appropriateness, language and writing aspects. Based on the total value of the validity of the problem-based practical instructions, these practical instructions are suitable for use with minor revisions at MTs Negri 1 Libureng, Bone Regency. The validity of the practical instructions is important to test, because validity is one of the criteria that determines whether a development product is good and suitable for use.

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the developed problem-based practicum instructions are valid. The validity value is 4.2, which means that the problem-based practicum instructions are included in the valid criteria. So that the results of this stage can be continued for field trials with subjects of junior high school/MTS class VIII students.

References

[1] Sulisyowati Eka dan Wisudawati Asih. 2005. Metodologi Pembelajaran Ilmu Pengetahuan Alam. Jakarta: Bumi Aksara.

[2] Balitbang Diknas. 2006. Permen No 22. 2006 tentang Standar Kompetensi dan Kompetnsi Dasar mata pelajaran biologi SMP, biologi SMA. Puskur. Balitbang Diknas.

[3] Yamasari, Yuni. 2010. Pengembangan Media Pembelajaran Matematika Berbasis ICT yang Berkualitas. Jurnal ISBN No. 979-545-0270-1: Jurusan Matematika FMIPA UNESA

[4] Hobri. 2009. Metodologi Penelitian Pengembangan (Developmental Research) Aplikasi pada Penelitian Pendidikan Matematika. http://hobri.blog.unej.ac.id/. Makassar. Diakses pada tanggal 4 Agustus 2014.

[5] Fitri, Deti. 2014. Pengembangan LKPD Tematik Integratif Pada Materi Garis Paralel Untuk Sekolah Dasar Kelas IV. Bengkulu: FKIP Universsitas Bengkulu

[6] Maharani Mylinda Uti. 2013. Pengembangan Petunjuk Praktikum IPA Tema Fotosintesis berbasis Learning Cycle untuk siswa SMP. Skripsi. Prodi Pendidikan IPA: Uiversitas Negeri Semarang.

[7] Trianto. 2014. Model pengembangan Terpadu dan implementasinya dalam kurikulm Tingkat Satuan Pendidikan. Jakarta: Bumi Aksara.

[8] Arikunto, Suharsimi. 2009. Dasar-Dasar Evaluasi Pendidikan. Jakarta:Bumi Aksara.