Validity of development of Physics student’s worksheet based on Inquiry Training Model to improve students creative thinking ability 10th grade Senior High School

Rumi Yuliska and Syafriani*

Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, Jl. Prof Hamka, Padang 25131, Indonesia

*syafri@fmipa.unp.ac.id

Abstract. This study aims to determine the validation of inquiry training based physic students worksheet to improve creative thinking ability 10th grade senior high school in Pertiwi 2 Padang city. This research method used research and development. The evaluation of the validity of LKPD is important to determine whether a LKPD has a proper quality. This study sought to evaluate the validity of the LKPD on the aspects of content, Construct, language and Graphical using a valid questionnaire which was developed based on Likert scale. The validity of the LKPD was assessed by three educational experts and practitioners. The data was later analyzed to determine the value of V of Aiken. The V of Aiken value of experts and practitioners on the aspect of content is 0,90, on the aspect of LKPD presentation style is 0,90, on the aspect of language is 0,96, on the aspect of face is 0,95. The value of V showed that the content, presentation style, language and face of the LKPD is categorized as valid. This means the LKPD has satisfied most of its standard quality criteria.

1. Introduction
The learning process in school basically aims to print knowledgeable and moral students. The acquired knowledge will be used to study life and the processes that occur in life. One of the natural sciences is physics. Physics is a science that studies natural phenomena or natural phenomena. one of the teaching materials that is often used in the learning process is the Student Worksheet (LKPD). LKPD is one of the teaching materials in the form of sheets of material which includes a series of learning experiences arranged systematically aimed at helping students learn well. In addition, through the use of LKPD, it can improve the efficiency and effectiveness of learning in schools, both time, funds, facilities, and energy to achieve optimal goals [1]. LKPD in learning is very effective in overcoming the disinterest of students in learning because the LKPD is compiled by including images that draw up to date information about the material, and questions. Creativity can be defined as a process to produce something new from existing elements by rearranging these elements. Creativity is related to three main components, namely: the ability to think creatively, expertise (knowledge, technical, procedural, and intellectual) and motivation. The ability to think creatively is related to aspects of creative thinking, namely fluency, flexibility, originality, and detail (elaboration) [2].

Based on observations and interviews at Pertiwi 2 High School in Padang, students assume that the teaching materials used in the learning process are normal. Teaching materials that are appropriate to the needs of students are needed to improve students' understanding. Furthermore, the teacher stated...
that so far some schools had bought LKPDs from publishers and tended to be unattractive and not innovative so they were not able to encourage students to be interested in learning. The results of the interview also showed that the teaching materials used during the learning process were not interesting, it was seen from language that was difficult to understand, the lack of images, the steps in the LKPD only dictated students in completing the LKPD, and some students admitted that they still had difficulty learning physics. So that students tend to not be maximal in solving problems given by the teacher (fluency), unable to provide varied answers in solving problems / problems (flexible) this results in learning outcomes and creative thinking skills that have not been as expected.

The use of learning models in a class will certainly affect the interest of students in learning. Teachers are required to be able to use learning models that are in accordance with the existing curriculum and class conditions. One learning model that can be used is the inquiry learning training model. The inquiry training model is a model designed to bring students directly into the scientific process through exercises that can condense the scientific process into a short period of time [3]. The aim is to help students develop discipline and develop the intellectual skills needed to ask questions and find answers based on their curiosity. The main learning outcomes of inquiry training are processes that involve activities of observation, collecting and processing data, identifying and controlling variables, making and testing hypotheses, formulating explanations, and drawing conclusions. In this model, students process the data logically and develop ways of thinking to find their own answers to questions.

Based on the thoughts and considerations that have been described above, it is deemed necessary to develop a teaching material namely student worksheets (LKPD) as one way to solve the problem of physics learning. The LKPD to be developed in this study is expected to help students improve learning outcomes and students' creative thinking abilities. The need for LKPD validation based on the inquiry training model to improve students' creative thinking. The purpose of validation is to get recognition and validation of the suitability of the device with needs so that it is appropriate and suitable for use in learning. The characteristics are valid, reliable, and can be used [4]. One important thing before building an instrument is the consideration of variables used to measure what must be measured. The validity test of the LKPD assesses the feasibility aspects of the construct (presentation component), component content, grammar, and language [5]. The presentation aspect is seen in the LKPD design which consists of LKPD preparation components in practice. This presentation is in accordance with the principles of compilation, the suitability of each component of the LKPD preparation, the worksheet steps according to the scientific approach step into the inquiry training model. It is appropriate that a valid device contains conformity between each component [6]. In the aspect of LKPD content, it appears that the substance of the material is in accordance with the competencies to be achieved, needs, truths, depths, and the present. In the graphical aspect, it can be seen from the use of fonts, type and size, layout, illustration of images and photos, and appearance of design [7]. In linguistic aspects, it can be seen from the readability, clarity of information, compatibility with the rules of Indonesian language that are good and correct, the use of language effectively and efficiently [8]. The purpose of this study was to determine the validity of LKPD based on the inquiry training model to increase the ability to think creatively.

2. Research Method

This study aimed to look at the feasibility of a product that is used. Validation is performed on the stages of develop in the development model ADDIE which ADDIE development phase, namely Analysis, Design, Develop, Implementation and Evaluation. The purpose of the validation by the validators is to assess and see the truth or validity of the student's worksheet as a good learning resources used by student's.

This research method using descriptive statistics. Descriptive research is not intended to test a particular hypothesis [9]. Descriptive research is conducted to describe, interpret and describe or explain what it is about a variable or state [10]. This research will explain the results of the validation stage on the development of student's worksheet based on inquiry training. The data collection
instrument uses a validation sheet filled by three expert validators for student’s worksheet validation. The validation sheet used has been validated first by the expert validator. The validation sheet can assess the four components: content validation, construct validation, language validation and graphical validation. The total score of each validator for all indicators is summed up and the validity value is given by using Aiken’s V formula. Step-by-step analysis of the validity of using the Likert Scale is as follows:

• Give a score the answer to each item by giving 4 (strongly agree), 3 (agree), 2 (disagree) or 1 (strongly disagree).
• Add up the total score of each indicator for all validators.
• Granting validity value using the formula Aiken’s $V$, which are:

$$V = \frac{\sum s}{n(c-1)}$$

Where $s = r - l_0$. $l_0$ is the lowest validity assessment figures (in hail this = 1), $c$ is the validity of the assessment to the highest number (in this case = 4) and $r$ is the number given by the validator. The validity category [11] is based on the final value obtained can be seen in Table 1.

| Value   | Criteria |
|---------|----------|
| ≥ 0.6   | Valid    |
| < 0.6   | Invalid  |

### 3. Results and Discussion

#### 3.1 Results of LKPD Validation

Validity test of student worksheets is done after the instrument validity is declared valid. Instrument assessment uses a validation sheet that includes the following indicators: Instrument validation is able to measure the level of validity of LKPD, Instruments have clear usage instructions, Instruments are easy to use in the assessment process, Instruments are able to measure eligibility, Instruments can measure the feasibility of presenting LKPD, Instruments can measure language feasibility used, the instrument can measure the quality of graphics, the instrument can measure aspects of the ability to think creatively, the instrument can measure the steps of the inquiry training model, the instrument has feedback on the results of the assessment, the size and type of writing instruments can be read clearly, display of structured instruments systematically, and the display of how to write instruments is consistent. The results of the average evaluation instrument validation carried out by three experts is equal to 0.96 declared valid. Furthermore, product validation was carried out. The LKPD validation was conducted by 4 validators, namely 3 experts and 1 practitioner. Inquiry training LKPD validation to improve students’ creative thinking skills consists of four aspects: content aspects, construction aspects, language aspects and graphic aspects. The results of the LKPD validation analysis can be seen in Table 2.

| Validation | Validator | Expert | Practitioner | Average V | Category |
|------------|-----------|--------|--------------|-----------|----------|
| Content    | A         | 0.96   | 0.82         | 0.93      | 0.90     | Valid    |
|            | B         |        |              |           |          |          |
|            | C         |        |              |           |          |          |
| Construction| A       | 0.97   | 0.82         | 0.91      | 0.90     | Valid    |
|            | B       |        |              |           |          |          |
|            | C       |        |              |           |          |          |
| Language   | A       | 0.96   | 0.96         | 0.96      | 0.96     | Valid    |
|            | B       | 0.96   |              |           |          |          |
|            | C       | 0.86   |              |           |          |          |
| Graphics   | A       | 0.95   | 1.00         | 1.00      | 0.95     | Valid    |
|            | B       |        |              |           |          |          |
|            | C       |        |              |           |          |          |
Based on the results of the analysis in Table 2 it can be stated that the average validation component results from the validator's contents are 0.90 in the valid category. Then the average result of the validation component of the validator's construction is 0.90 in the valid category. Furthermore, the average result of the validation of language components from the validator is 0.96 in the valid category, and the average results of the graphical component validation from the validator are 0.95 in the valid category. Overall the results of the analysis from the validator were 0.93. These components are said to be valid because on the Likert scale a large value of 0.6 is obtained. Thus this LKPD can be used in the learning process.

3.2 Validation Results of Students' Creative Thinking Abilities

Validation of aspects of creative thinking ability was carried out by 4 validators, namely 3 experts and 1 practitioner. The results of the validation are summarized in Table 3.

Table 3. Results of Analysis of Aspects of Students' Creative Thinking Abilities

| Component                        | Value V | Category |
|----------------------------------|---------|----------|
| The aspect of Thinking Fluency   | 0.92    | Valid    |
| The aspect of Flexible Thinking  | 0.92    | Valid    |
| The aspect of Original Thinking  | 0.92    | Valid    |
| The aspect of Elaborative Thinking | 0.92  | Valid    |
| The aspect of Evaluative Thinking | 0.83  | Valid    |
| **Average Value**               | **0.90**| **Valid**|

Based on the results of the analysis in Table 13, it can be explained that the average aspects of creative thinking ability are in the valid category with an average of 0.90, said to be valid because on the Likert scale the results obtained are large than 0.6 where the values are categorized as valid.

3.3 Results of Validation of Learning Model Components inquiry training

Validation of the inquiry training Learning Model component was carried out by 4 validators, namely 3 experts and 1 practitioner. The results of the validation are summarized in Table 4.

Table 4. Results Of Validation of Learning Model Components Inquiry Training

| Component                      | Value V | Category |
|--------------------------------|---------|----------|
| Presentation of the Problem    | 0.92    | Valid    |
| Verification Data Collection  | 0.83    | Valid    |
| Experimentation Data Collection| 1.00    | Valid    |
| Organization of Data and       |         |          |
| Formulations Conclusions      |         |          |
| Analysis of Inquiry Processes  | 0.83    | Valid    |
| **Average Value**              | **0.92**| **Valid**|

Based on the results of the analysis in the Table, it can be explained that the validation of the components of the training inquiry learning model with an average of 0.92 valid categories is said to be valid because on the Likert scale the results obtained are large than 0.6 where the value is categorized as valid.
Based on the validation aspects that have been carried out it is stated that Worksheet 10th grade high school physics students are based on inquiry training to improve students' creative thinking skills in a valid category because the V values of all aspects are above 0.6. Thus the LKPD validation stage can be developed.

4. Conclusion
The results of the student worksheet validation on the feasibility aspect of the content are in the valid category with an average of 0.90, the construct aspects are in the valid category with an average of 0.96, the aspects of the language in the valid category with an average of 0.96 and graphic aspects also in the valid category with an average of 0.95. The product is said to be valid if each indicator is ≥ 0.6 and invalid <0.6. Overall LKPD based on inquiry training is valid which can be implemented in the learning process.

References
[1] Nurdin, S., & Andriantoni. (2016). Kurikulum Dalam Pembelajaan. Jakarta: Raja Grafindo Persada.
[2] Munandar, U. (2014). Pengembangan Kreativitas Anak Berbakat. Jakarta: Rineka Cipta.
[3] Joyce, B., Weil, M., dan Calhoun, E. 2011. Models Of Teaching. Percetakan Pustaka Belajar. Yogyakarta.
[4] Sukardi 2010 Evaluasi Pendidikan Prinsip & Operasional Jakarta PT. Bumi Aksara.
[5] BSNP 2014 Instrumen Penilaian Buku Teks Pelajaran Tahun 2014 Jakarta BSNP.
[6] Yusuf, A Muri 2005 Dasar-dasar dan Teknik Evaluasi Pendidikan Padang UNP.
[7] Sungkowo 2010 Panduan Pengembangan Bahan Ajar Berbasis TIK Jakarta Kementerian Pendidikan Nasional.
[8] Depdiknas 2008 Panduan Pengembangan Bahan Ajar Jakarta Direktorat Pembinaan SMA.
[9] Suharsimi, Arikunto 2010 Dasar-dasar Evaluasi Pendidikan Jakarta Bumi Aksara.
[10] Sukardi 2007 Evaluasi Pendidikan Jakarta Bumi Aksara.
[11] Azwar, S 2015 Reliabilitas dan Validitas Edisi IV Jogya Pustaka Belajar.