Validity of student worksheet based on guided inquiry learning model assisted by digital practicum tool

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Abstract. Learners need guidance of learning activities that will be done in the classroom to aims the learning activities be effectively. Guidance of this activity can be a teaching material like student worksheet. One effort that can be done by teacher to improve the competence of learners is to develop qualified Student Worksheet (LKPD). LKPD is the sheet that contains the task as guide activities for all aspects of learning that aims to maximize the understanding of a learning material. An LKPD is said qualified if it has validity criteria. The validity of LKPD is assessed by expert or professionals in their field. The purpose of this study was to determine the validity of LKPD based Guided Inquiry Learning model assisted by digital display practicum tool. This type of research is development research using ADDIE model, where validity is at the development stage. The research instrument used was a questionnaire validation sheets rating. Data analysis used is descriptive analysis. The result of validity is obtained by LKPD based Guided Inquiry Learning model assisted by digital display practicum tool with validity criteria with an average value of 0.92. Therefore, this LKPD can be used in the learning process.

1. Introduction
Activities of the students in practical activities more than the activity of learners in the classroom. In this case the lab has an important role to increase the activity of learners in learning and strengthen the understanding of concept in theory. Learners need guidance activities that will be done in the laboratory for practical activities in learning to run effectively. Teaching materials that can be used in the learning process there are various kinds. The student worksheet is a type of printed material that is often used by educators in the learning process.

Student worksheet is one learning resource that can be developed by educators as facilitators in learning activities [1]. The prepared student worksheet can be designed and developed in accordance with the conditions and situation of the learning activities to be faced. Based on the observations on LKPD used in schools, it is known that LKPD used is not in accordance with the expectations and applicable format, namely: 1) there is no instruction, 2) no supporting information to increase the curiosity of learners, 3) sheets of activities have not been in accordance with the scientific approach, 4) the tools used in the lab are still manual and difficult to use.

Efforts that can be done to minimize some of these problems, such as developing LKPD in accordance with the structure and format that has been determined, LKPD design is interesting and has a high level of clarity so easily understood by learners. LKPD is developed using a learning model whose orientation can improve the ability of learners, both the ability to analyze and solve problems,
as well as the ability to work scientifically. One of the learning models that can improve the ability of learners in finding and finding their own answers to a questionable problem is the Guided Inquiry Model. The main principle of Guided Inquiry is to point on learner’s activity to seek and find their own answers to a questionable problem, so hopefully it can rise their self-confidence [2,3].

LKPD developed is designed student worksheet assisted by practicum tool based on digital technology. In this case, the tool that still manual lab work will be modified into a practical tool-based sensor and digital technology. IPA requires practicum equipment in applying a scientific approach at the stage of collecting data then developed practicum tools [4]. The advancement of sensor and digital technology opens the opportunity of making practicum and measurement tools more effective and efficient in its use so that the expected goals and outcomes can be optimized [5]. The process of digital technology is the initialization of the Arduino microcontroller programming, after which the read and data capture Sensors are performed by the Arduino microcontroller and will be displayed on the LCD to show the measurement results [6]. System performance in terms of accuracy and practicality is very good to be implemented in physics experiments in schools or laboratories. Based on accuracy, precision and measurement results, measurements with digital technology can be performed more accurately and precisely [7].

In order to use LKPD in learning can improve the competence of learners, then LKPD that developed is qualified LKPD. One of the qualified LKPD criteria is LKPD has high validity. The concept of valid indicates the existence of conformity, meaningfulness, and usability [8]. Validity of the product can be done by presenting some experienced experts to assess new products designed [9]. Components of the validity of LKPD development include the content feasibility components, language, presentation, and graph. These components include: 1) Components of content feasibility (conformity with the curriculum), 2) Language components (readability, clarity of information, conformity with good and correct Indonesian language rules, effective use of language), 3) Presentation component (clarity of purpose to be achieved, order of presentation, interaction, completeness of information) and 4) Graphic components (use of fonts, layouts, illustrations, drawings, display design). This validity criterion will be used in assessing the developed LKPD [10].

Based on this description, it is necessary to conduct an assessment or validation of LKPD based on guided inquiry learning model based on a digital technology practicum tool to ensure the feasibility of using LKPD in overcoming the learning problems that have been exposed.

2. Research Method
This type of research is research development (research and development), with development model used is model ADDIE (Analysis, Design, Development, Implementation, Evaluation). Validity is at Development stage. Development is the process of realizing the design into reality. That is, if the design is still a planning framework, then in the development of LKPD and digital practice tools should be developed. One important step in the development stage is the trial before it is implemented, in the form of validation from the experts.

LKPD and the developed practicum tools were first validated by experts acting as validators. The purpose of LKPD validation is to look the truth of concepts, forms, look and grammar used in LKPD and the impact indicators developed. In digital practicum tools include the purpose, the operation technique, the accuracy of use, and the working principle of the tool. Validation can determine the function or failure of a product based on the material, construction and language criteria. The main parts of the LKPD that are validated are the suitability of KD, indicators, correctness of concepts, language and graph used. Validation is said to be complete, if validator declare valid against LKPD and practice tool so that ready to be tested try. The input of the validator is used to fix or revise the developed LKPD. Validation is done by using LKPD validation sheet and practicality of the instrument are filled by validator.

The steps to test the validity of LKPD and the practicum tools to the validator are: 1) Requesting the willingness of physics lecturer to see the feasibility of LKPD and the digital practicum tool and the correctness of the learning concept that has been made, 2) The lecturer is required to provide an
assessment of LKPD and digital practicum tools which have been created based on the items on the validity test sheet. 3) After the assessment is done, it is revised with the advice that given by the validator. Validation done by lecturers aims to get feedback on the entire contents of the material with KI and KD that have been established, material accuracy, and the design form LKPD and continued with language validation used in the design of LKPD created.

In general, the instrument of validity data collection in this study consisted of instrument validation sheet and LKPD validation sheet [11]. Validity analysis using Likert scale based on validation sheet, with steps: 1) Scoring for each item with alternative answers: (4 = Strongly Agree, 3 = Agree, 2 = Disagree, 1 = Strongly Disagree), 2) Summing total score of each validator for all indicators, 3) Granting validity value using Aiken's formula in Equation 1.

\[
V = \frac{\sum s}{n(c-1)}
\]  
where: \( s = r - l_0 \), \( l_0 \) = the lowest validity score (in this case = 1), \( c \) = the highest validity score (in this case = 4), \( r \) = the number given by the validator. To determine the level of validity of LKPD developed can be seen in Table 1.

| Table 1. Validity Category |
|---------------------------|
| Value | Category |
| ----- | -------- |
| ≥ 0.6 | Valid    |
| < 0.6 | Invalid  |

3. Results and Discussion

The results of LKPD design and practicum tools at the design stage will be developed at the development stage. This stage of LKPD and the practicum tool that has been designed will be tested for its validity. Validation is done by 3 lecturers from UNP. Because the product developed is LKPD assisted by digital display practicum tool, then validation done in two ways, that is LKPD and free fall practicum tool. The LKPD validation is performed by validators, while tool validation is performed by RA and US validators. as well as by comparing actual calculations with the calculation of digital display practicum tools. Validation results are described as follows:

3.1. Instrument Validation Result

Before validating the product, validation of the instrument will be used first. To obtain valid data collection instruments, an assessment of the validation instrument is performed. The results of the assessment of 3 validators to the instrument indicate that the validation sheet consisting of validation of learning plan (RPP), LKPD, practicum tool, and assessment is valid. Further validation instrument assessment results are presented in Table 2. Based on Table 2, it can be stated that the instrument has been developed in the valid category, where the value of V is greater than 0.6. Therefore, this instrument can be used.

| Table 2. Validation Assessment Instrument Result |
|------------------------------------------------|
| Validation Instrument | V Value | Category |
|-----------------------|---------|----------|
| LKPD Validation Sheet | 0.92    | Valid    |
| RPP Validation Sheet  | 0.93    | Valid    |
| Assessment Validation Sheet | 0.86 | Valid |

3.2. LKPD Validation Result

LKPD validation is performed after instrument validity. The instrument assessment uses a validation sheet that includes the following indicators: clarity of instructions for filling in validation sheets, statements made in accordance with the indicators, objectives to be achieved, does not contain multiple meanings, using simple and easily understood scoring formats, and the language used in accordance with good and correct EBI rules. LKPD validation based on guided inquiry learning model
consists of three aspects, namely content aspect, linguistic aspect, presentation aspect and aspects of graffiti. LKPD validation results can be seen in Table 3.

| Aspect | V Value | Category |
|--------|---------|----------|
| Contents | 0.92 | Valid |
| Language | 0.93 | Valid |
| Presentation | 0.90 | Valid |
| Graphic | 0.92 | Valid |

Based on Table 3, it is stated that the developed LKPD is in a valid category, where in each aspect obtained V value that greater than 0.6. It can be interpreted that LKPD based on guided inquiry learning model assisted by digital technology practicum tools is valid and can be used in learning.

3.3. Practicum Tool Validation Result
Practicum tool that have been developed can be seen in Figure 1.

![Figure 1. Free Fall Practicum Tool.](image)

Validation of practicum tool using validation tools. Validation tools include accuracy, precision, effectiveness, ease and clarity. This aspect is assessed by two validators. The tool validation results are presented in Table 4.

| Aspect | V Value | Category |
|--------|---------|----------|
| Accuracy | 0.80 | Valid |
| Precision | 0.83 | Valid |
| Effectiveness | 1.00 | Valid |
| Convenience | 1.00 | Valid |
| Clarity | 0.94 | Valid |

Table 4 explains that the average validation value of the Free-Falling Motion tool is in valid criteria. Therefore, this tool can be used in the learning process. In addition to validation tools through questionnaires by validators, tool validation is also measured empirically by research teammates. This empirical validation can be done by finding the measurement accuracy from the developed laboratory equipment.
The accuracy of the measurement is determined by comparing the measurement data of the system with theoretical calculations. The results of the measurement accuracy of the Free-Falling Motion tool can be seen in Table 5.

| g (measuring) | g (count) | error (%) | accuracy |
|---------------|-----------|-----------|----------|
| 9.3           | 9.8       | 5         | 0.95     |
| 9.5           | 9.8       | 3         | 0.97     |
| 9.5           | 9.8       | 3         | 0.97     |
| 9.4           | 9.8       | 4         | 0.96     |
| 9.6           | 9.8       | 2         | 0.98     |

Table 5 shows that the measurement results of the apparatus accuracy for 5 experiments obtained an average value of 96% means that the accuracy value of this tool is acceptable because it is in the range of 80% - 100%. The calculation results by comparing the results from the tool and the result using the formula obtained the average value of error rate relative to 5 times the experiment is 1.8%.

3.4. RPP Validation Result

The result of RPP validation by include the guided inquiry learning model can be seen in Table 6. Based on Table 6 it is stated that the RPP is designed in all three aspects, that is content, construct and language aspects are in valid categories and can be used in learning. Based on the validation result that has been done, it is found that the developed product included in the category is valid. However, there are some suggestions given by validators. The validators provide suggestions, advantages and disadvantages that are useful for formative evaluation and revision of LKPD. The suggestions given by the validator can be seen in Table 7.

| Aspect    | V Value | Category |
|-----------|---------|----------|
| Contents  | 0.82    | Valid    |
| Construct | 0.80    | Valid    |
| Contents  | 0.82    | Valid    |

Table 6. RPP Validation Result

Based on Table 7, it can be seen that in the preliminary validation LKPD there are still some revisions to be done in improving LKPD designed. One example of a revision is to complete the image source on each image used in LKPD. Examples of LKPD before and after revision can be seen in Figures 2 and Figure 3.
Figure 2. Sample Image on LPKD Before Revision.

Validation of LKPD based on guided inquiry learning model is in valid criteria with an average value of 0.92. Components Improvements to the suggestions provided by validators are useful in the development of LKPD and free fall practicum tools. The validity of the product can be done by several experienced experts to assess the weakness and strength of the resulting product [8]. After validation is done, generated valid LKPD based on guided inquiry learning model and valid practicum tool.

4. Conclusion

Validation of LKPD based on guided inquiry learning model is in valid criteria with an average value of 0.92. Components validity LKPD development include feasibility component content, language, presentation, and graphics. In addition to validation LKPD, also performed RPP, Assessment and Digital Practicum Tools validation. All products developed after being validated are within valid criteria and fit for use in physics learning in schools.

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