

Validity of Student Worksheets using Inquiry Based Learning Models with Science Technology Society Approach for Physics Learning

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Abstract – Physics learning aims to develop knowledge and train students' thinking skills. But in reality, students haven't been able to develop because they are less trained to find concepts independently. Student worksheets includes teaching materials that can help students find concepts and apply these concepts. The purpose of this study was to produce student worksheets using the inquiry based learning model with the community technology science approach with criteria valid. Learning using a valid student worksheets can improved student's competence. This type of research is R&D using the Plomp model. The validity assesment is carried out by expert reviews, then analyzed using Aiken's V formula. The results of validity of student worksheets meet the valid criteria of 0.79. Based on the results of the study, it can be concluded that the student worksheets uses the inquiry based learning model with a science technology society approach valid for use in Physics learning.

Keywords – Sudents worksheets, Inquiry Based Learning, Science Technology Society Approach.

I. INTRODUCTION

Physics learning aims to develop knowledge and train students' thinking skills. But in reality, students have not been able to develop it because they are less trained to find concepts independently. One of the tasks of educators is to develop learning tools, namely all components that support the implementation of learning. Simple learning tools consist of Syllabus, Learning Implementation Plan (RPP), and Learning Materials for students. Teaching materials are defined as all forms of materials used to help teachers / instructors in carrying out teaching and learning activities in the classroom^[1]. The teaching material in question can be written material or unwritten material so as to create an environment / atmosphere that allows students to learn.

Student worksheets are included in printed teaching materials that function to help students learn independently, actively and creatively. Student worksheets contains sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students, both theoretical and practical, which refers to the basic competencies students must achieve in learning^[2]. The tasks contained in the LKS can encourage student active participation and train students' literacy skills in the learning process^[3]. Therefore, the use of student worksheets is expected to help students improve their knowledge and skills.

Based on the observations, it was revealed that learning Physics in High School was not yet in accordance with the prevailing National Education Ministerial Regulation. The obvious problem is the use of student worksheets during the learning process which is considered less optimal to use. Furthermore, in the learning process it appears that there is still a teacher center and the teacher has not used a varied learning model in accordance with the 2013 Curriculum. Whereas Physics Learning is effective in achieving all competencies simultaneously, there are training to apply concepts to real problems (knowledge), training independent planning activities (attitudes), and training the use of certain instruments (skills) are practicum activities^[4]. Therefore, student worksheets is needed which can make the learning process become a student center and make students active in practical activities in the laboratory.

One learning model that can lead to activeness and creativity of students in solving problems is an inquiry based learning model. Inquiry based learning is a series of learning activities that involve maximally all the ability of students to search for and investigate problems systematically, critically, logically and analytically so that they can formulate their own findings with trust self^[5].

There is research related to inquiry based learning model which is a learning model that can make learning contextual to improve students' thinking and literacy skills^[6]. One of the advantages of the inquiry based learning model is that students can acquire investigative knowledge because they are directly involved in the discovery process, can understand scientific concepts and ideas well, and can form and develop self-concept of students^[7].

In order for the problematic situations that arise in learning to be in accordance with real life, the approach that can realize this is the science technology society approach. The science technology society approach is seen as a learning process that is always in accordance with the context of human experience. In this approach students are invited to enhance creativity, scientific attitude, use concepts, and science processes in everyday life^[8]. The science technology society approach also links the concepts understood in technology applications. So it is hoped that learning physics using this approach can also provide a strong basis for technological advances^[9].

The use of inquiry based learning models with science technology society approach makes students able to understand science concepts and ideas well in the process of problem solving so that learning becomes more meaningful and can improve students' learning competencies. By using an inquiry based learning model with a science technology society approach to learning, students can act as learning centers because students will be able to develop their own concepts. By following the steps of the inquiry based learning model and the science technology society approach contained in the student worksheets, students become more active in building knowledge and developing attitudes and skills^[10]. Therefore, the inquiry based learning model with science technology society approach is very suitable to be delivered using student worksheets teaching materials because one of the functions of the student worksheets is to minimize the role of educators, but to activate students^[2].

Based on the description that has been delivered, the researcher develops the student worksheets using the inquiry based learning model with science technology society approach to Physics learning. The purpose of this study was to determine the level of validity of the developed student worksheets.

II. METHOD

The type of research is development research using the Plomp model. Design research according to Plomp (2013) includes the systematic study of designing, developing, and evaluating educational interventions. Where the Validity is at the development stage. The purpose of LKPD validation is to look the truth of concepts, forms, look and grammar used in LKPD and the impact indicators developed. 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 the validator states that it is valid for LKPD and practical tools so that it is ready to be tested. The input of the validator is used to revise the developed LKPD^[11].

The validity assessment of the student worksheet use an inquiry based learning model with a science process skills approach carried out by experts who are experienced in their fields. Validity analysis uses a Likert scale with steps (a) Giving scores for each answer item strongly agree (4), agree (3), disagree (2), and strongly disagree (1), (b) Add the total score for each validator for all indicators, (c) Granting validity values using the Aiken's V formula like equation (1).

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

with: $s = r - lo$, lo = the lowest validity score (in this case = 1), c = the highest validity score (in this case = 4), r = the number given by the validator. Validity categories can be seen in Table 1.

Table 1. Category Validity

Value	Category
$\geq 0,6$	Valid
$< 0,6$	Invalid

(Source: Azwar, 2015)

Based on Table 1, it can be seen the criteria of the value of agreement validity obtained. This validity is done using the Aiken's V formula and is categorized on two values, namely valid and invalid. The developed student worksheet can be said to be valid when the value obtained exceeds or equals 0.6.

III. RESULT

Validation was carried out by 3 lecturers from UNP who were experts in the fields of Physics, language and development, namely Festiyed (FY), Fatni Mufid (FM), and Amali Putra (AP). The validation results are described as follows.

1. Result of Instrument Validity

Before conducting product validation, validation of the instrument used to validate the product being developed is done first. The instrument validation was conducted by supervisors and examiners namely Yulkifli (YL), Desnita (DS) and Yerizon (YR). The results of instrument validation can be seen in Table 2.

Table 2. Result of Validity Instrument Assessment Sheet

Instrumen	Aiken's V Value	Category
Instrument for Validity of student worksheet	0.86	Valid
Instrument or Validity of RPP	0.92	Valid

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. Thus this instrument can be used.

2. Result of Student Worksheet Validity

The validity test of the LKPD is conducted after the instrument validity test. Appraisal of instruments uses a validation sheet which includes the following indicators: clarity of instructions for filling in the validation sheet, statements made in accordance with the indicators, objectives to be achieved, not containing double meanings, using a simple and easy to understand assessment format, and the language used according with good and correct Indonesian language rules. The validity of the student worksheets uses the inquiry based learning model and the community technology science approach consists of four aspects, namely the content aspect, construction aspects, language aspects, and graphic aspects. The results of the student worksheets validity can be seen in Table 3.

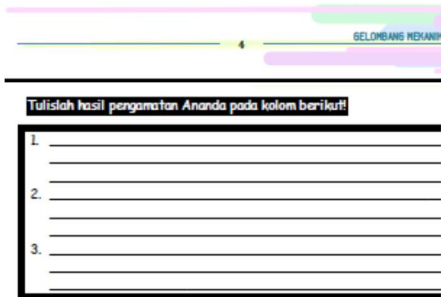
Table 3. Result of Validity of student worksheet

Component Validity	Aiken's V Value	Category
Content	0,78	Valid
Construction	0,72	Valid
Language	0,75	Valid
Graphic	0,92	Valid
Average	0,79	Valid

Based on Table 3 it is stated that the developed student worksheets is in the valid category with an average value of 0.79, where in the aspects of content, construction, language, and graphics the value of V is greater than 0.6. Thus this student worksheets can be used in the learning process. Based on the results of the validity that has been done, it is obtained that the product developed is

included in the valid category, but there are some suggestions given by the validator. The suggestions given by the validator can be seen in Table 4

Table 4. Result of Validity of student worksheet

Before Revision	After Revision
1. There are several ineffective sentences and ambiguous sentences. 2. The material should not be widely presented at the student worksheets, but constructed by students through the stages of inquiry based learning model and science technology society approach 3. In the orientation phase, the illustration image displayed must be more than 1 as a comparison and as a direction for students to formulate problems and hypotheses.	1. The corrected sentence becomes effective and not ambiguous. 2. Reducing the material presented. 3. Add illustration images in the orientation phase.
	
4. In the orientation phase there is a column of results of the activities of students.	4. Add columns to student activities in the orientation phase.
	
5. The conclusion phase is more led again according to the material / concept.	5. Provide a reference to the conclusion phase so that students are more focused on the material / concept.

Before Revision	After Revision
Berdasarkan hasil penyelidikan, tuliskanlah kesimpulan Anda! Apakah hasil yg diperoleh sesuai dengan hipotesis yang telah dikemukakan sebelumnya? Apakah hipotesis tersebut dapat diterima/ditolak karena telah/tidak sesuai dengan hasil penyelidikan?	Bagaimana kesimpulan Anda mengenai penyelidikan karakteristik dari gelombang mekanik yang telah Anda lakukan? 1. Gelombang pada tali disebut _____ karena _____ 2. Gelombang pada slinki disebut _____ karena _____ 3. Besaran fisika yang terdapat pada gelombang tali adalah _____ 4. Besaran fisika yang terdapat pada gelombang slinki adalah _____ Apakah hasil yg diperoleh sesuai dengan hipotesis yang telah dikemukakan sebelumnya? Apakah hipotesis tersebut dapat diterima/ditolak karena telah/tidak sesuai dengan hasil penyelidikan?

Several revisions have been made to the prototype according to the validator's suggestion. The revised results from this stage can be used in physics learning which will see the level of practicality and effectiveness in learning.

IV. CONCLUSION

The results of validity of student worksheets using the inquiry based learning model with the community technology science approach meet the valid criteria of 0.79. The components of student worksheet validity include content, construction, language, and graphics. Based on the results of the study, it can be concluded that the student worksheets uses the inquiry based learning model with a science technology society approach valid for use in Physics learning.

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REFERENCES

- [1] Depdiknas: Panduan Pengembangan Bahan Ajar. Jakarta: Direktorat Pembinaan Sekolah Menengah Atas (2008)
- [2] Prastowo, Andi.: Pengembangan Sumber Belajar. Yogyakarta: Pustaka Insan Mandiri (2011)
- [3] Asrizal, Ali Amran, Azwar Ananda, Festiyed. Effects of science student worksheet of motion in daily life theme in adaptive contextual teaching model on academic achievement of students. *Journal of Physics: Conference Series*. 2019; **1185**: 012093
- [4] Darwata SR, Yulkifli, and Yohandri. Validity of Student Worksheet Oriented on POE Model as Digital Practicum Tool. *Journal of Physics: Conference Series*. 2019; **1185**: 012124. DOI:
- [5] Ahmadi: *Strategi Belajar Mengajar*. Bandung: Pustaka Setia (2005)
- [6] Asrizal, Ali Amran, Azwar Ananda, Festiyed. Development of adaptive contextual teaching model of integrated science to improve digital age literacy on grade VIII students. *Journal of Physics Conference Series*. 2018; **1116**(3):032004
- [7] Simsek, P & Kabapinar, F.: "The effect of Inquiry based learning on elementary student's conceptual understanding of mater, scientific procces skills and science attitudes". *Procedia-Social and behavioral science*, 2 (2010): 1190-1194.
- [8] Aikenhead, Glen.: Research into STS science education. Univercity of Saskatchewan Canada. Vol. 9 No 1. (2009)
- [9] Yulkifli, Afandi Z, and Yohandri. Development of Gravity Acceleration Measurement using Simple Harmonic Motion Pendulum Method Based on Digital Technology and Photogate Sensor. *IOP Conference Series: Materials Science and Engineering*. 2018; **335**: 012064.
- [10] Yulkifli, Ningrum MV, and Indrasari W. The Validity of Student Worksheet Using Inquiry-Based Learning Model with Science Process Skill Approach for Physics Learning of High School. *Jurnal Penelitian dan Pengembangan Pendidikan Fisika*. 2019; **5**(2): 155-162
- [11] Plomp, T.. Educational Design Research: An Introduction dalam Tjeerd Plomp dan Nienke Nieveen (Eds). *Educational Design Research*. Enschede: SLO, (2013): 10-51.

- [12] Yudha SFA, Yulkifli, and Yohandri. Validity of Student Worksheet Based on Guided Inquiry Learning Model Assisted by Digital Practicum Tool. *Journal of Physics: Conference Series*. 2019; 1185: 012058.
- [13] Azwar, Saifuddin.: *Metode Penelitian*. Yogyakarta: Pustaka Pelajar. (2015)