

NEEDS ANALYSIS OF PHYSICS LEARNING AT HIGH SCHOOL IN PADANG TO DEVELOP PERFORMANCE ASSESSMENT APPLICATION BY THE WORKSHEET BASED-SCIENTIFIC LITERACY

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ABSTRACT

Education in the 21st century is developing very rapidly. It can be seen from the many uses of science and technology in all aspects of life. The development of technology also has a big impact on education. Learning cannot be separated from the assessment process. Teachers must be innovative, creative, and able to develop and use learning media that are in line with the development of science and technology. The researchers are interested in making assessment applications that can be used as a medium to assist teachers in the process of grading assignments given to students. This type of research was an analysis conducted in the context of the need to make a skills assessment application. This research was conducted in class X of high school in Padang. The instrument used in this research was a questionnaire sheet containing positive and negative responses distributed by using the google form. The questionnaires given have been validated by experts. The data analysis technique used was the descriptive statistical analysis. The results showed that the implementation of skill learning is not optimal especially on the uses of technology for students' assessment and most students lack motivation in learning. The assignment given by teachers were still not optimal because most of the tasks were not related to daily life. Then, the teacher was not optimal in giving worksheets before doing the practice. Therefore, the researcher designs the application of performance skills assessment that is equipped with worksheets based-scientific literacy. .

Keywords : Skills Assessment Application, Android, Assessment Process



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I. INTRODUCTION

Education is an interactive activity that aims to realize the next generations of a nation to be better. Education in the 21st century is developing very rapidly. The development of technology also has a big impact on education. The government explained that the learning process carried out aims to make students active and have creativity in learning, and later it is hoped that students will be able to find their knowledge [1]. Furthermore, the curriculum currently used in Indonesia is the 2013 revised curriculum which emphasizes that the learning process must be centered on students to produce a generation capable of critical and innovative thinking. The curriculum in Indonesia always changes according to the guidance of the times. The solution that has been made by the Indonesian government to fulfill the demands of education in the 21st century is by making improvements to the curriculum [2]. At this time the revised 2013 curriculum in Indonesia is the answer for an improvement in the quality of education [3]. Everyone must have broad insight, critical thinking skills, and literacy to face education in the 21st century. The teaching and learning process is an activity that must have interactive characteristics in various components to achieve the desired learning objectives. All these components must be interrelated, influence each other so that the desired goals are achieved [4].

Physics Learning in the student competence as a whole has characteristics that can be divided into 4 types of materials: facts, concepts, procedures, and metacognitive. Physics learning will also form the students'

thinking ability, besides that it will also emphasize the scientific process [5]. The process in the revised 2013 curriculum learning is currently carried out with an approach in the scientific field, namely using learning which can encourage participants to be educated so that it is easier to observe, image, try, reason, and communicate physics which are part of natural knowledge. Physics learning must reflect several competencies, including competencies in the form of scientific thinking, scientific attitudes, and scientific work. Physics learning activities can be carried out through several processes such as: asking, trying, observing, communicating, and reasoning [6]. In the physics learning process, it cannot be separated from the assessment. Assessment is an activity that is carried out on a deliberate, systematic, and continuous basis and is used to assess the competence of students who are expected to become information that is very likely to make decisions [7].

In the 2013 curriculum, the assessment is seen from three aspects: affective, cognitive, and psychomotor assessments. In Physics learning, not all assessments are suitable for use during learning [8], but as much as possible the assessment that will be carried out by the teacher can cover the three competencies required. Assessment of work performance or commonly referred to as performance can be done, namely:

observing the activities that the students do. This assessment, it can be done to assess the achievement of competency which requires the participants to do certain tasks, for example (1) practicing worship, (2) practicing in a laboratory, and (3) practicing exercises.

The thing that is very important when the PBM occurs is the interaction between teachers and students. Interactions such as those that occur, such as when teachers convey knowledge to students, in their delivery use models, methods, and strategies in the learning process and to facilitate the delivery of teacher knowledge in implementing it on varied media which can help in the learning process. Some of the concepts contained in physics learning are abstract so they are difficult to understand. For this reason, the role of the teacher is needed in solving the problems that occur [9].

Various solutions have been found to improve teacher competence, one of which is PKB or Continuous Professional Development which has three programs, namely the development of ideas, scientific publication, and innovative work. Innovative work is one of the difficult problems for teachers to meet these demands [10]. Teachers must be able to be innovative, creative, and able to use and develop learning media that are in line with the development of science and technology in the present. The development of science and technology in particular also affects the field of education. Technology plays a role to be part of the development to achieve the goals of education. The use of multimedia as a medium in learning affects the learning process [11]. Media is a very important factor in today's era to support the realization of learning objectives [12].

LKS is an activity guide in solving a problem [13]. In making worksheets, one must pay attention to certain structures. LKS has a structure that includes titles, study instructions, basic competencies, supporting information, assignments, or work steps and assessments [14]. The structure of the worksheets is used as a reference to make the worksheets feasible for use. LKS that have been tested for their eligibility can be used by students as a learning resource.

Scientific literacy means the ability to use scientific skills. Scientific literacy can also be defined as how a person makes decisions and then implements them into community life, culture, and economic growth [15]. Scientific literacy is very important for students to have in an era like this. The very rapid development of science and technology demands that students have excellent scientific literacy skills so that students can overcome problems with society in this modern era [16]. Learning that integrates scientific literacy will be more meaningful than those that do not use scientific literacy because learning is connected to the real-world context [17]. The real-world context that is connected to learning will make students gain success in learning and real-life [18].

Physics worksheets that integrate scientific literacy have advantages [19]. First, the development of the integrated scientific literacy physics worksheets combines the material as a whole. Second, using these physics worksheets, which integrate scientific literacy can improve students' reading interest. Third, the use of physics worksheets can improve student competence so that the assessment of student competence is optimal.

Based on these descriptions, the researchers are interested in developing this assessment application as a medium to assist teachers in the performance appraisal process and develop worksheets with scientific literacy that can be used as teaching materials by teachers as well as learning media for students.

II. METHOD

In this research, the research method used by the researchers was the analysis method. In conducting a needs analysis to make a skills assessment application, it was equipped with worksheets-based-scientific literacy. This analysis was carried out at high school in Padang in class X. The questionnaire was distributed to the students using Google Forms. The questionnaire given has been validated by an expert and can be used.

The analysis stage is a process that is carried out to find out if there is a problem that occurs in the learning process so that it can provide an accurate solution. The solutions used were either in the form of learning programs or improved learning management. Needs analysis is an indispensable step to find out what needs are needed to help the learning process. Furthermore, at the analysis stage that has been carried out by the researchers, it includes four components: tasks, analysis of student characteristics, curriculum, and materials.

1. Student Characteristics

The student characteristics are seen from various aspects of each student, namely aspects of interest, aspects of attitude, aspects of learning styles, aspects of learning motivation, and aspects of thinking skills [20]. This analysis was conducted to see student interest, student attitudes, student learning motivation, student learning style, student thinking ability, and students' initial ability to learn physics.

2. Curriculum Analysis

In the analysis of the curriculum, attention is paid to the curriculum that is being used by the school. The activities are carried out so that the research carried out is under the provisions of the current curriculum. Teaching materials used by students are considered so that the research carried out is under the required needs. The teacher's skills assessment is also considered, and the teacher bets the assessment instrument for basic skills competencies according to skills assessment standards and the use of technology in conducting assessments.

3. Task Analysis

This analysis was carried out to see the form of the student worksheets, the assessment of student assignments, student time to make assignments, collection of assignments, and return of assignments that have been collected.

4. Material Analysis

In this analysis, it can be done to find out various physics learning materials that are difficult for students to understand and will become a reference in the research carried out. Learning materials that are difficult to find will find solutions to make it easier for students to understand the material.

In this study, a questionnaire sheet instrument that was shared by using Google Form was used containing positive and negative responses from students. The data analysis technique was a descriptive statistical analysis. The data were analyzed and then described by the researchers [21].

In this study, the researchers used various techniques, one of which was the quantitative descriptive analysis technique of needs analysis. The category of needs analysis is obtained by calculating the score obtained from each respondent in the form of a positive response and a negative response. The score for each indicator is obtained by the following equation [22]:

$$P = \frac{\sum x}{\sum xi} \times 100\%$$

Information:

P = Percentage

x = score obtained on each indicator

xi = number of respondents needs analysis carried out with the provisions as shown in Table 1

Table 1. Student Needs Analysis Error! Reference source not found.

Percentages(%)	Criteria
0-20	Very Low
21-40	Low
41-60	Quite High
61-80	High
81-100	Very high

By the analysis of the student's needs, so the criteria for the needs needed can be determined, such as: very high, high, quite high, low, and very low. After a needs analysis was carried out, the problems will be found that need to be given the right solution.

III. RESULTS AND DISCUSSION

The results of the needs analysis questionnaire distributed to the students of high school in Padang were:

1. Student Needs Analysis

The results of the questionnaire analysis that showed the student characteristics student assignments, curriculum, and material obtained the results:

a. Analysis of the student characteristics

The analysis of students' characteristics was related to aspects of student interest in physics learning. The analysis of aspects of interest can be viewed from 4 indicators, namely: (1) students feel happy about learning physics when it is related to everyday life, (2) interest in learning physics due to activities practicum, (3) a feeling of pleasure in studying physics related to new things and (4) a great feeling of curiosity in learning physics. The interest analysis of these student characteristics was shown in Figure 1.

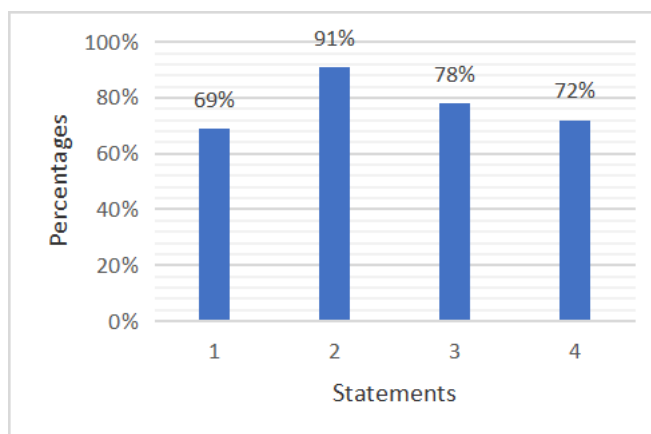


Fig.1. Graph of Student Interest Analysis

Based on the graph above, it can be seen that the level of student interest in physics was in the range of 69% to 91%. This suggests that the interest that students have towards learning physics is high. Of the four statements, the second statement has the highest percentage of the other statements. This means that the indicator of student interest in learning physics is subject to high practicum activities.

b. The Results of Affective Aspect Analysis

The analysis of the student characteristics related to aspects of affective in Physics learning obtaining from the analysis of the attitude aspect can be viewed from four indicators, namely: (1) being grateful for God's creation by studying physics, (2) being disciplined during the learning process, (3) being honest in doing assignments and processing the results of physics practicum, and (4) always trying to succeed in doing physics assignments. The analysis of the students' affective characteristics in graphical form was in Figure 2 below.

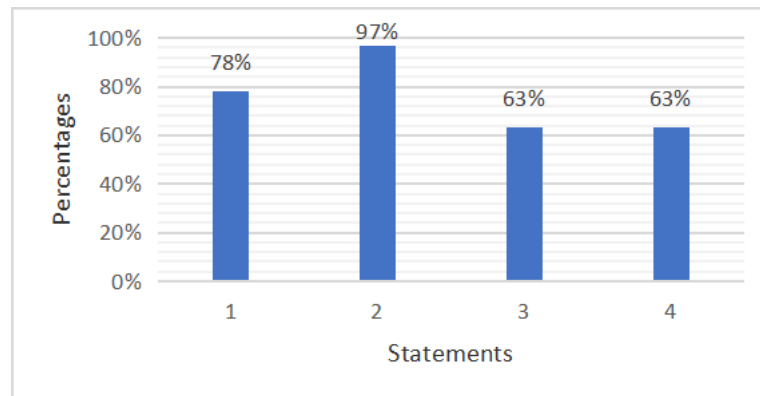


Fig. 2. Graph of Student Affective Aspect Analysis

Based on the graph above, it can be seen that the level of student affective in physics is in the range of 63% to 97%. The average value of students' attitudes was 75.2%. This shows that the student affective towards learning physics is high of the four statements. The second statement has the highest percentage of the other statements. This means indicators of being disciplined when the learning process is high.

c. The Results of Student Learning Motivation Aspect Analysis

The analysis of the student characteristics was related to the aspects of student motivation towards learning physics. The results obtained from the analysis of the aspects of student learning motivation can be viewed from three indicators, namely: (1) trying to always believe in doing physics assignments given by the teacher, (2) having a strong motivation in studying physics, and (3) always trying to create a learning environment which are fun. The analysis of learning motivation from student characteristics was presented in Figure 3.

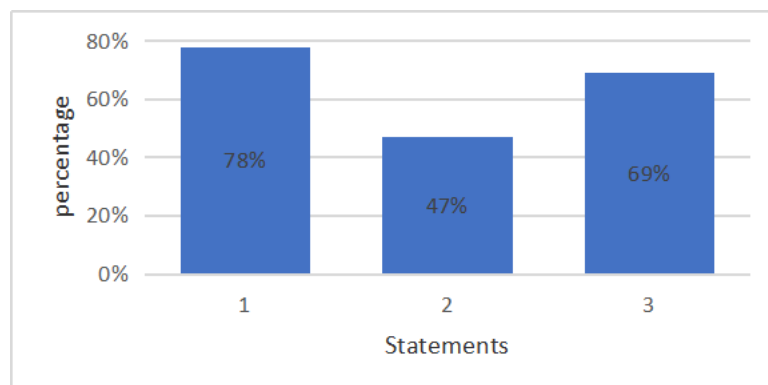


Fig. 3. Graph of Analysis of Student Learning Motivation

Based on the graph above, it can be seen that the level of student motivation in physics learning material is in the range of 47% to 84%. The average value of student motivation is 64.6%. This shows that the motivation of the students is high.

d. Students' Thinking Ability

The analysis of the student characteristics can be related to aspects of student learning styles on thinking skills. The analysis obtained from the aspect of students' thinking ability in terms of three indicators, namely: (1) understand physics easily when studying first, (2) propose ideas about a problem in learning physics. (3) understanding physics is easier if the teacher provides practical activities. The analysis of the student thinking ability in Figure 4 was as follows.

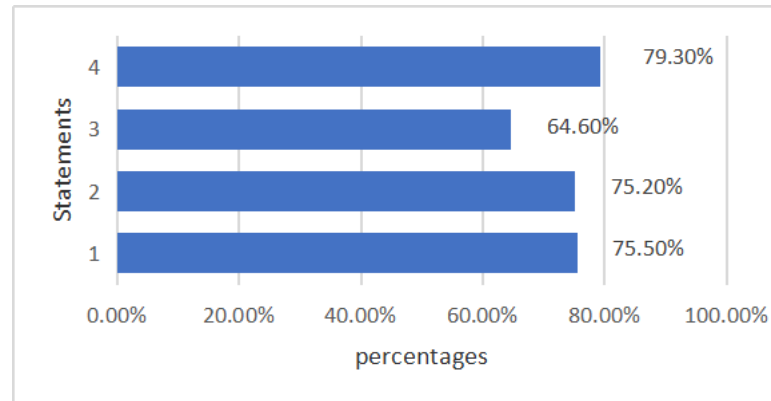


Fig. 4. Students' Thinking Ability Graph

Based on the graph, it can be seen that the students' thinking ability level in physics is in the range of 66% to 88%. The average value of students' thinking skills was 79.3%. This states that the thinking skills possessed by students are high. Broadly speaking, it can be seen in the concept of the average characteristic of a student with the following information: (1) student interest, (2) student attitudes, (3) student learning motivation, and (4) student thinking ability. The characteristics of students in every aspect of physical learning are presented in Figure 5.

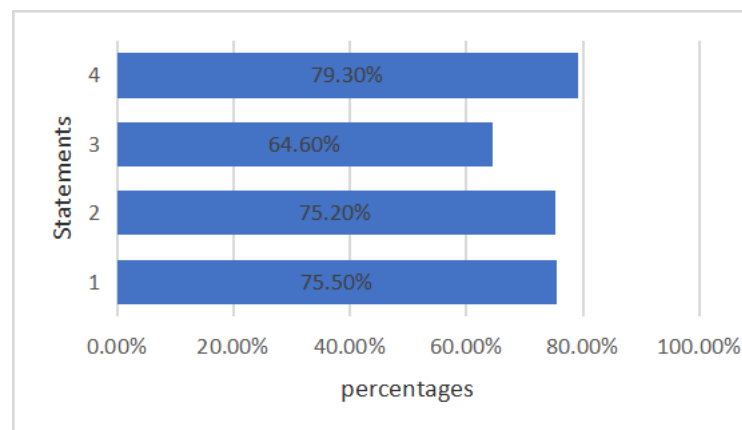


Fig. 5. Graph of Student Characteristics Analysis

Based on Figure 5 above, it can be seen that the aspects of student learning motivation are obtained lower than other aspects and are in the high enough category.

2. Student Task Analysis

Obtaining results from the analysis of student assignments were obtained based on the seven indicators, namely: (1) students collect assignments on time, (2) asking teachers or classmates when they have problems doing assignments, (3) becoming more familiar with physics material after working on assignments, (4) the teacher explains the material before giving the assignment, (5) the assignment given is related to daily life, (6) the suitability of the task with the material provided by the teacher and (7) the collection of student assignments to the teacher. The percentage graph of the student assignment analysis can be seen in Figure 6.

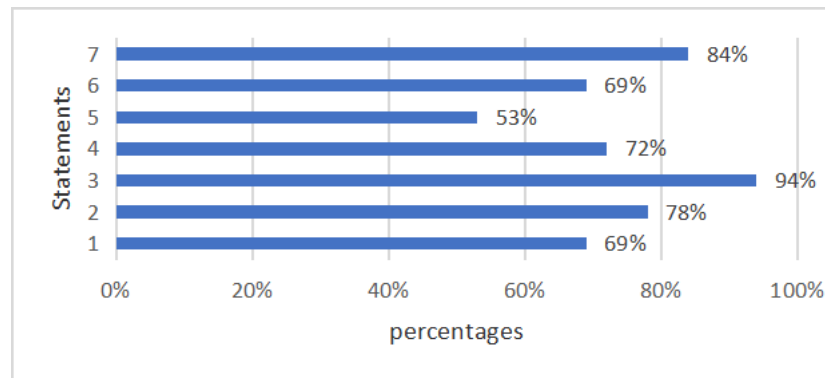


Fig. 6. Graph of Student Task Analysis

Based on Figure 6 above, it can be seen that students were given assignments to do at home in the high category, and the assignments were given various forms of assignments. The average score for the student assignment analysis was 74.1% and came from a range of 53% to 94%.

3. Curriculum Analysis

Curriculum analysis was seen from: (1) the scientific process in physics learning, (2) the provision of teaching materials during the learning process and (3) the attractiveness of the physics teaching materials provided. The graph of the percentage of analysis results from the curriculum can be seen in Figure 7.

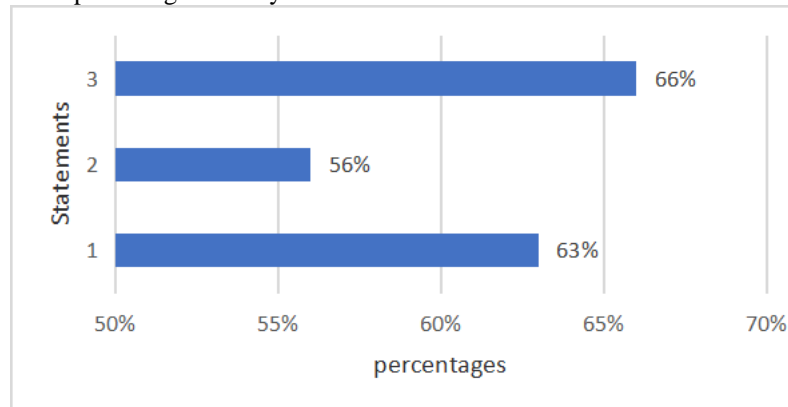


Fig. 7. Graph of Curriculum Analysis

Based on Figure 7 above, it can be seen that the attractiveness of teaching materials in the category is quite high while the provision of teaching materials during the learning process is in the high enough category.

4. Analysis of Learning Materials

The analysis of this learning material was seen from students who like and students who find it difficult to understand the material. The material analysis was seen from the physics material studied at grade X of high school, namely: (1) the nature of physics, (2) the physical size and its unit, (3) vector, (4) straight movement, (5) movement of parabolic, (6) circular motion, (7) Newton's law of movement, (8) newton's law of gravity, (9) try to increase energy, (10) momentum and impulse, and (11) harmonic vibrations. The percentage can be seen in Figure 8.

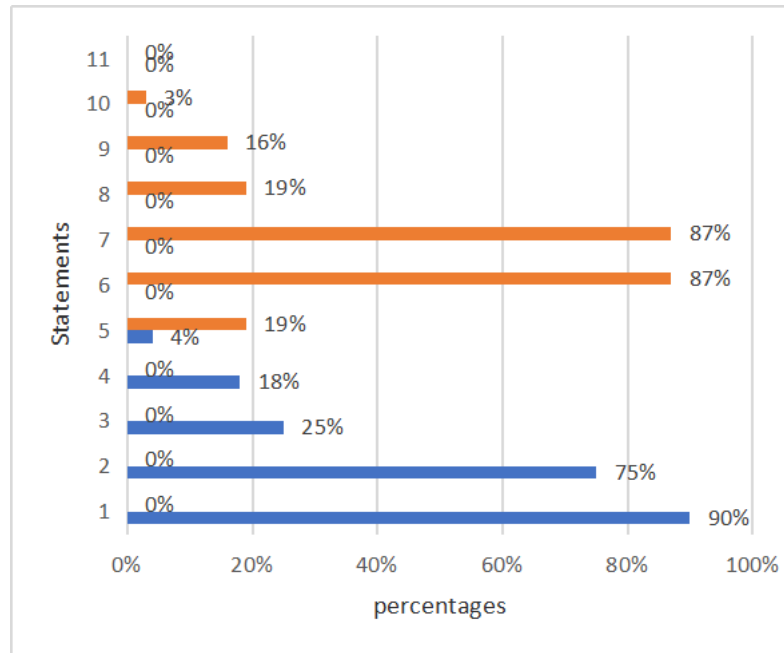


Fig. 8. Graph of Learning Material Analysis

Based on Figure 8 above, it can be seen that the material most liked by students was the nature of physics and physical quantities. Meanwhile, the most difficult material in a circular motion and Newton's law.

The follow-up based on needs analysis was by taking advantage of technological developments that can help the assessment process in the learning process, namely by making an android-based assessment application with the design image in Figure 9.

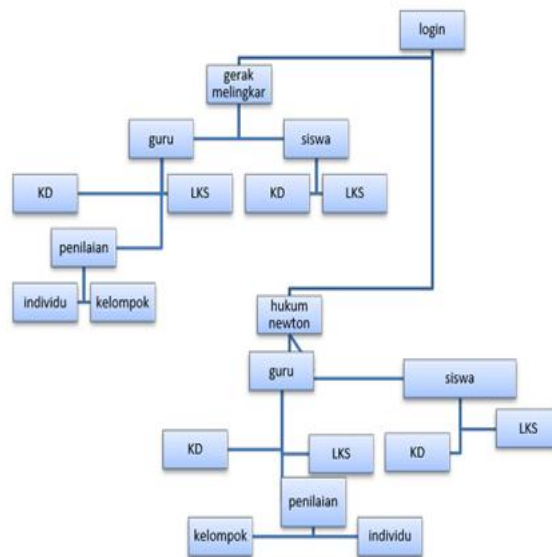


Fig. 9. Design drawings of Performance Skills Assessment Application

The initial stage of application design was to create an application icon and flowchart. The main display of the application created was the login activity and activity menu. The username on the login activity was designed to make it easier for teachers and students because the username for the teacher menu displays three menus, namely: basic competencies, worksheets, and assessment. Meanwhile, students only displayed 2 menus, namely: basic competencies and student worksheets only. The performance appraisal application was the main product in this research. Furthermore, it was equipped with worksheets with scientific literacy. In the assessment menu, a new layer appeared to input the name of the class, the names of students in the class, the division for groups and individuals as well as the results of student scores which will be displayed and

stored in table form. The application was designed and named Physter. The application identity was designed as Figure 10.



Fig. 10. Application Identity for Performance Skills Assessment

In the application, there is an identity for the performance skills assessment application containing the application name icon and the name of the application maker made by the Physics Department Student, Universitas Negeri Padang. This identity is used as a sign of researchers who make performance skills assessment applications.

IV. CONCLUSION

Based on the needs analysis at high school in Padang, the research was obtained; (1) The implementation of learning in the realm of skills was not yet optimal (2) The use of technology has not been optimal for the assessment of student learning. (3) There was still a lack of motivation for most of the students in learning (4) The tasks given by the teacher were still not optimal because most of the tasks have not been linked to daily life. (5) Teachers have not been optimal in giving worksheets before doing a practicum.

REFERENCES

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