JPII 6 (2) (2017) 335-340

Jurnal Pendidikan IPA Indonesia

http://journal.unnes.ac.id/index.php/jpii

ANALYSIS OF KNOWLEDGE, UNDERSTANDING, AND SKILLS OF PHYSICS TEACHERS OF STATE SENIOR HIGH SCHOOLS IN DEVELOPING AND ANALYZING TEST ITEMS

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DOI: 10.15294/jpii.v6i2.10679

Accepted: March 28th, 2017. Approved: July 30th, 2017. Published: October 17th, 2017.

ABSTRACT

This study is aimed to determine the level of knowledge and understanding of physics teachers to the evaluation of learning and to describe the physics teachers' skills in constructing and analyzing items. This type of research is quantitative descriptive, the technique of data collection is done by survey method using a developed questionnaire instruments. The population in this study is all physics teachers of Senior High School throughout the city of Banda Aceh. Those became the samples were 32 physics teachers of Senior High School randomly selected. The data obtained were analyzed descriptively. The results showed that only physics teachers of SMAN 4, SMAN 7, SMAN 8, SMAN 10 and SMAN 13 Banda Aceh who have very high category of knowledge and understanding level of the learning evaluation and the skills of physics teachers of Senior High School in Banda Aceh in constructing and analyzing the test items have not been satisfactory.

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Keywords: evaluation; knowlegde; understanding; skills

INTRODUCTION

Teachers are professional educators with the primary task of educating, teaching, guiding, directing, training, assessing, and evaluating students (Kartomo, 2016). Professional teachers will be reflected in the performance of duties characterized by expertise, both in materials and methods (Shabir, 2015).

Professional ability is a capability that must be possessed by a person to perform tasks and activities in the field of science that must be deliberately studied and then applied to the public interest (Agusniar, 2015). Thus, professional teachers are teachers who have the ability to plan learning, implement learning, evaluate learning and have a high responsibility in improving student learning achievement. Competence will be realized in the form of mastery of professional deeds in performing its function as a teacher (Widodo, 2012).

Ability in conducting learning evaluation is one of the professional competence of teachers. There is no learning without evaluation because evaluation is the process of determining the quality of learning outcomes, or the process to determine the level of achievement of learning goals by learners (Syafrudin, 2002). Assessment and evaluation of student learning outcomes is one of the abilities that must be possessed by a teacher. Osnal et al. (2016) suggests that one professional teacher in accordance with the main task and function is skilled in presenting teaching materials in the classroom and outside the classroom, as well as professionals in evaluating learning outcomes. Assessment of learning outcomes of learners is one of the abilities that must be owned by a teacher that is included in pedagogic competence (Camellia & Chotimah, 2012).

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According to Azim & Khan (2012), assessment is a conventional activity, which is practiced in schools on a day-to-day basis. It is also a process, which helps in developing students' learning. It provides the teacher with an opportunity to review their own teaching and to enhance students' learning. Gaytan & McEwen (2007) argued that assessment is an important way to respond to student accountability. Teachers should set assessment goals, measure criteria, and intended outcomes before meaningful assessment methods can be achieved. According Widoyoko (2013), assessment can be interpreted as an activity to interpret data measurement results. Thus a teacher should be based on measurement and assessment data in evaluating the learning .

Evaluations can encourage students to be more active in learning continuously, and can also encourage teachers to further improve the quality of the learning process and encourage schools to further improve the facilities and quality of school management. Therefore, in the learning, teachers are not only required to teach well, but also to evaluate well. To measure the success of learning, teacher requires skills in evaluating (Handayani, 2014). The ability to evaluate learning outcomes is an absolute basic ability that teachers must possess.

The ability of teachers in the mastery of evaluation techniques is shown by the ability to design evaluation patterns, develop test instruments, be able to analyze problems, compile problems in various cognitive levels of Bloom, able to do objective scoring, see the results obtained by students, and select appropriate action as an effort to follow up assessment results/measurements. According to Afriyani (2013), in implementing the evaluation of learning, there are some activities undertaken by the teacher, namely: planning of writing a problem in which the teacher makes a grid problem so that the questions are arranged more directed in accordance with the materials and teaching purposes, then carry out tests, and process the results of the test then the teacher can interpret the test results into the scoring book, the inputted scores are in accordance with the value obtained by students.

Result of National Examination (UN) year 2015/2016 for physics lesson shows that physics student achievement of SMAN in Banda Aceh city is relatively low. One of the causes that may make the students fail in the UN is the level of questions. The level of UN questions consists of high-level questions (C4, C5, and C6), while the teacher's level of questions is low level (C1, C2, and C3). Based on interviews, several physics teachers at SMAN Banda Aceh who are currently studying S2 at the Graduate School of Unsyiah also acknowledge their weaknesses in evaluating their students, especially in compiling the questions. Furthermore, the results of Yusrizal et al. (2011) also showed that the component of the students' learning achievement result from the certified teachers of Physics, Chemistry and Biology of SMAN Banda Aceh is still low.

Based on the description, this study aims to determine the ability of physics teachers of state Senior High Schools in Banda Aceh to the evaluation of learning. In particular, this study aims to determine the level of knowledge, understanding and skills to compose and analyze items by physics teachers of state Senior High Schools in Banda Aceh. The benefit of this research is to be input to physics teachers and head of Banda Aceh State Senior High School, and Department of Education in Aceh Province.

Humans are different from each other. It results in differences in work or learning achievement. To know the existence of differences in student achievement, we required a tool that can measure the state of the individual, and gauges which are called tests. The success of the evaluation of learning outcomes in schools is highly dependent on the quality of test instruments used. Sulistyorini et al. (2013) suggests that the achievement of cognitive competence of students in the learning process can be seen from how students solve the problem of the given learning materials which are usually manifested in the form of tests.

A test is a systematic procedure created in the form of standardized tasks assigned to individuals or groups to be worked on, answered or responded to, either in written form, oral or deed (Matondang, 2009). The test of learning outcomes is one way to trace the abilities that students have had after following the teaching and learning process for a certain time (Lababa, 2008). Evaluation is the stage after the teaching-learning process is implemented to complete the teaching-learning cycle as an interactive educational process, ranging from goal formulation to the provision of interaction support facilities. According to Aji and Winarno (2016), the evaluation process is one of the teachers' task that will determine the direction of the next learning process.

The picture of high and low learning outcomes which is obtained by using a bad test is not a true description of student achievement. The test is a number of questions that have correct or false answers, questions that require answers, questions to be answered with the objective of

measuring a person's capability level or uncovering certain aspects of the tested person (Munadi, 2011). The main purpose of asking students questions is to know whether the material taught has been mastered by the students completely or not. According to Harmawati et al. (2014) one of the factors that must be addressed is to improve the quality of the tests on the items used in each evaluation.

A professional teacher must have competence in constructing and analyzing problems or tests because the tests are used as a tool to measure learning attainment. Teachers play an important role in the preparation of evaluation in the form of tests. Hence, every teacher is required to have a big responsibility to plan and carry out evaluation (Suryawati & Yulfikar, 2012). According to Saikhoni (2015), one of the requirements of a good test is that the test must be valid, the test should precisely measure something to be measured. The more qualified the assessment of learning, the better the teacher's understanding of the weaknesses and strengths of students in learning certain material (Kusairi, 2012).

Learning outcomes are achievements that can be shown in the form of number symbols by students after following the learning process. Evaluation can be used as a tool to know the extent to which the learning objectives have been achieved. According to Badriyah (2014), evaluation is a tool used to determine the understanding the mastery of learners to the material that has been delivered. Assessment basically aims to obtain information about the development process and learning outcomes of learners and the results of teachers' teaching (Osnal et al., 2016). Thus, assessment and evaluation are basically aimed at obtaining information about the development of the learning process and outcomes of students and the results of teachers'teaching.

METHODS

This research uses descriptive quantitative approach with development research type. This study was conducted from July to October 2016. The research activities followed the steps (1) develope a questionnaire instrument to assess teachers' knowledge and understanding of learning evaluation and the ability to develop and analyze problems; (2) conduct surveys to teachers of state senior high schools in Banda Aceh. Instruments for assessing knowledge, comprehension and problem-solving skills are developed with reference to the theory of developing the instrument of a typical performance (Gable 1986; Djaali & Muljono, 2008). Instrument validity is formed by using correlation formula of product moment by Pearson, that is correlation between grains with its total (Pujihastuti, 2010). Validity test results obtained 38 valid items. Reliability testing conducted by Alpha Cronbach formula (Son et al., 2014) obtained the reliability coefficient of the instrument of 0.93.

To give an interpretation of the results of the teacher's level of knowledge analysis of learning evaluation, categorization is used according to Azwar (2012), that is:

$X \leq 35$	Knowledge of learning evaluation Very Low
$35 < X \leq 49$	Knowledge of learning evaluation Low
$49 < X \leq 63$	Knowledge of learning evaluation Medium
$63 < X \leq 77$	Knowledge of learning evaluation High
$X > 77$	Knowledge of learning evaluation Very High

To give an interpretation of the results of the teacher's level of understanding analysis of the learning evaluation, the following categorization is used.

$X \leq 32,5$	Understanding of learning evaluation Very Low
$32,5 < X \leq 45,5$	Understanding of learning evaluation Low
$45,5 < X \leq 58,5$	Understanding of learning evaluation Medium
$58,5 < X \leq 71,5$	Understanding of learning evaluation High
$X > 71,5$	Understanding of learning evaluation Very High

While in giving interpretation to result of skill level in preparing and analyzing test items, the following categorization is used.

X ≤ 27,5	Skill in arranging and analyzing problems Very Low
27,5 < X ≤ 38,5	Skill in arranging and analyzing problems Low
38,5 < X ≤ 49,5	Skill in arranging and analyzing problems Medium
49,5 < X ≤ 60,5	Skill in arranging and analyzing problems High
X > 60,5	Skill in arranging and analyzing problems Very High

RESULTS AND DISCUSSION

The result of analyzing the level of knowledge, understanding, and ability of physics teacher in preparing and analyzing data is presented in Figure 1. The detailed categories of knowledge, understanding, and skills of Physics teachers in compiling and analyzing the problems of each school can be seen in Table 1.

The results of the analysis reveals that 16 state senior high schools in Banda Aceh, it can be seen that only five schools achieved the category of 'very high" in terms of knowledge, understanding and skills to compile & analyze the problem. The five SMANs are SMAN 4, SMAN 7, SMAN 8, SMAN 10 and SMAN 13 respectively.

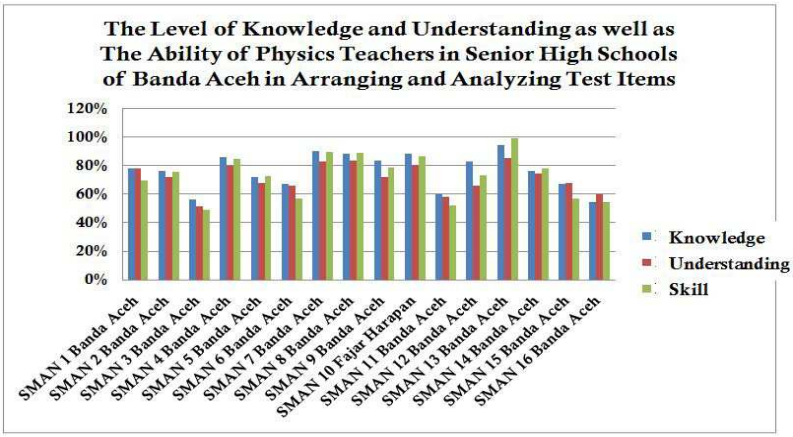

Figure 1. The Level of Knowledge, Understanding, and Skills of SMAN Physics Teachers in Banda Aceh City in Preparing and Analyzing Problems

There are three SMAs namely SMAN 1, SMAN 2, and SMAN 5 that achieve high category in terms of knowledge, understanding and skills of teachers in preparing and analyzing the problems. Furthermore, it is also revealed that physics teachers from three high schools (SMAN 9, SMAN 12, and SMAN 14) whose level of knowledge about learning evaluation is very high achieved high category in terms of the level of understanding and skill to arrange & analyze the problems.

The result also revealed that there are two high schools that the level of knowledge and understanding of learning evaluation is in the high category, but the skills of composing & analyzing the problem is in the medium category. The schools are SMAN 6 and SMAN 15.

Table 1. Percentages and Categories of Knowledge, Understanding, and Skill Levels of SMAN Physics Teacher in Preparing and Analyzing the Problems

School Name	Knowledge		Understanding		Skill	
	%	Category	%	Category	%	Category
SMAN 1	76,5	high	71	high	53,5	high
SMAN 2	75	high	65,5	high	58,5	high
SMAN 3	55,3	medium	47	medium	38	rendah
SMAN 4	84	very high	73	very high	65,5	very high
SMAN 5	70,5	high	62	high	56	high

SMAN 6	66	high	60	high	44	medium
SMAN 7	88,5	very high	75,5	very high	69	very high
SMAN 8	86,5	very high	76	very high	68,5	very high
SMAN 9	82	very high	65,5	high	60,5	high
SMAN 10	86,5	very high	73,5	very high	66,5	very high
SMAN 11	58,5	medium	53	medium	40	medium
SMAN 12	81,3	very high	60,3	high	56,3	high
SMAN 13	92,5	very high	77,5	very high	76,5	very high
SMAN 14	75	very high	68	high	60	high
SMAN 15	66	high	61,5	high	44	medium
SMAN 16	53,4	medium	54,5	medium	42	medium

Furthermore, it is known also that the physics teachers of SMAN 16 still have the level of knowledge, understanding, and skills to prepare & analyze the problem in the medium category. The physics teachers of SMAN 3 achieved the level of knowledge and understanding of learning evaluation which is still medium, and the skill of composing & analyzing the problem which is in the low category. SMAN 3 is included into one of the best and favorite SMAN in Banda Aceh city. In SMAN 2, the pysics teachers' level of knowledge, understanding and skills in preparing and analyzing items are in the high category. Physics teachers of SMAN 5 achieved the level of knowledge, understanding and skills in preparing and analyzing items which is in the medium category.

The percentages of knowledge and understanding of physics teacher to learning evaluation are 74.8% and 65.2% respectively. The percentage of skills of the physics teacher to compile and analyze the items is 56.2%. It can be visually seen in Figure 2.

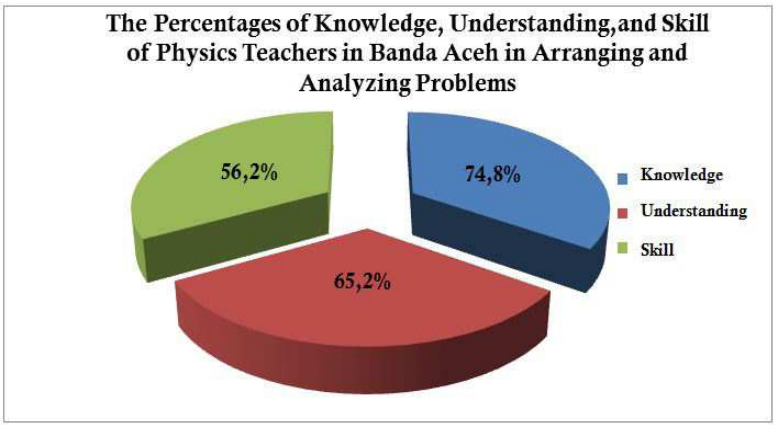

Figure 2. The Percentages of Knowledge, Understanding,and Skill of Physics Teachers in Banda Aceh in Arranging and Analyzing Problems

Generally, the level of knowledge and understanding and skills of physics teachers of State Senior High School in Banda Aceh in preparing and analyzing the items has not been satisfactory. Physics teachers do not have the ability and skill to optimize the test properly and quality. This results in weakness in students who will face tests both at national and international levels. Munasco (2013) suggested that teacher quality factor (qualification) is considered the most dominant. It also influences the physics learning outcomes and forms of test used. This brings impact on students' learning outcomes to be less satisfactory. Professional teachers in accordance with the main tasks and functions are: (1) Able to prepare the lesson plans; (2) Able to construct quality test results; (3) Skilled in presenting teaching materials in class and outside the classroom, professional in evaluating learning outcomes (Osnal et al, 2016).

CONCLUSION

Based on the analysis, it can be concluded that only physics teachers from SMAN 4, SMAN 7, SMAN 8, SMAN 10 and SMAN 13 of Banda Aceh have a level of knowledge and understanding of learning evaluation which is categorized into very high. The skills of physics teachers of SMAN Banda Aceh in preparing and analyzing the items have not been satisfactory.

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