

## Research Article

# The Ability of Vocational High School Teachers to Developing HOTS Question

Anas Arfandi<sup>1</sup>, Hamidah Suryani<sup>2</sup>, Nurhaedah<sup>3</sup>, Onesimus<sup>1</sup>, Panennungi<sup>1</sup>

<sup>1</sup>Department of Civil and Planning Engineering Education, Universitas Negeri Makassar, Makassar, Indonesia

<sup>2</sup>Department of Family Welfare Education, Universitas Negeri Makassar, Makassar, Indonesia

<sup>3</sup>Department of Primary Teacher Education, Universitas Negeri Makassar, Makassar, Indonesia

Contact email: anas.arfandi@unm.ac.id, hamidah.suryani@unm.ac.id, nurhaedah@unm.ac.id, onesimus.sampebua@unm.ac.id, panennungi@unm.ac.id.

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**Abstract:** The purposes of this study are to 1) describe the form of the question made by vocational school teachers, 2) elaborate the teacher's method in preparing questions to evaluate the learning outcomes, 3) explain the teacher's comprehension in preparing questions that measure high order thinking skills, and 4) analyze the teacher's skills in preparing questions that measure high order thinking skills. The research is descriptive and correlational. The population and sample of this research are productive vocational high school teachers who teach at the Technical of Construction and Property expertise program in the province of South Sulawesi. Data collection was carried out in March – June 2021. Determination of the samples used the Slovin formula with an error rate of 0.05. The sample used is 59 respondents. Analysis of research data using descriptive statistics and cross-tabulation. The results of the study show that 1) the form of questions combines an objective test and a subjective test. 2) the preparation of examination questions is preceded by making a question grid, then dividing the categories of questions based on their cognitive level. 3) Dominant teachers have understood the preparation of questions that measure high-level thinking skills, however, almost 40% of teachers still need further strengthening. 4) Dominant teachers have been skilled in preparing HOTS questions, however, there are still 20% of teachers who still need assistance in preparing High-Order Thinking Skills (HOTS) questions. 5) Teachers with 11-20 years of service are more dominantly skilled at preparing HOTS questions.

**Keywords:** Exam Questions, Higher Order Thinking Skills, HOTS, Technical of Construction and Property, Vocational High School.

## 1. Introduction

Vocational education is one type of education that prepares a generation that is ready to work and must be able to overcome the challenges of the 21st-century world of work. This education not only prepares students to work, but also to continue their studies and build businesses. The heavy burden of vocational education requires all components of vocational education to be able to optimize the resources they have. Especially the teacher's ability to design and develop learning as well as the strong

motivation and enthusiasm of students in achieving the expected competencies [1].

One of the competencies that must be possessed by a teacher is pedagogic competence. Pedagogic competence relates to the skills and abilities of teachers in understanding teaching science. The teacher's ability in the pedagogic aspect can be reflected through the teacher's skills in managing the learning process to the process of assessing student learning outcomes. The management of learning outcomes assessment is related to the teacher's ability to construct learning outcomes evaluation tools to processing and reporting data [2].

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The education process is a means of preparing a generation that is smart and able to solve the problems they will face in their daily lives. The weak ability of students to use their thinking skills to solve problems is one of the conditions that often arise in learning. Students always get a variety of information in learning but only train their memories [3], [4].

On the other hand, students still have difficulty in relating these conditions to the situations they face. The knowledge they master seems irrelevant to what they are facing. This then reduces their ability to solve problems given in problem-based learning [5].

Seeing these conditions, the improvement and development of the teaching and learning process take place dynamically. One of the teacher's abilities that must be possessed and are the most important part is the ability to create and develop student learning outcomes evaluation tools that can train high order thinking skills (HOTS). High-level thinking skills are one of the efforts in the context of preparing superior generations in the future. High-order thinking skills (HOTS) are skills that train students to solve problems comprehensively and thoroughly. Literacy, creativity, and critical thinking skills are provisions for generations to face future challenges [6]–[8].

Evaluation of learning outcomes is an identifying activity to see whether the planned learning objectives have been achieved. Evaluation measuring tool that is often used in the teaching and learning process is a test. The test is one form of instrument used to make measurements, namely collecting information on the characteristics of an object [9], [10]. In making evaluation tools in the form of tests, it is necessary to classify the cognitive level of questions so that it will make it easier for students to work on questions in stages, from the easiest to the most difficult. The classification of questions uses the education taxonomy compiled by Bloom [11].

From several research results, it was revealed that the results of observing the questions provided by the teacher only measured low-order thinking skills (Lower Order Thinking) so that students' thinking abilities could not develop [12]. Students in Indonesia are not trained in solving questions that measure HOTS, as well as learning that has not trained HOTS. Teachers as conductors in learning are still not optimal in doing this [13], [14].

According to the results of observations by Widiawati & Joyoatmojo [15] at Vocational High School Surakarta who have business and management majors, it shows that so far there has been an uneven distribution of questions. This inequality means that the questions given to students only focus on C1-C3. Thus, students are not accustomed to working on HOTS-oriented questions, namely C4-C6. Based on the description above, it is very necessary to be

given understanding and training in implementing learning and preparing questions based on high-order thinking skills (HOTS).

Based on the above background, this study aims to 1) describe the form of learning outcomes evaluation questions that are always made by vocational school teachers for the Property Technology expertise program in South Sulawesi; 2) Describe the mechanism for preparing learning outcomes evaluation questions that are always made by Vocational High School teachers for the Property Technology expertise program in South Sulawesi; 3) explain the understanding of vocational school teachers in the Property Technology expertise program in South Sulawesi in compiling questions that measure high-level thinking skills; 4) describe the skills of vocational school teachers in the Property Technology expertise program in South Sulawesi in compiling questions that measure high-level thinking skills, and 5) elaborating the skills of preparing teachers for HOTS questions based on the teacher's tenure.

## **2. Research Methods**

This research is a descriptive correlational that uses a quantitative approach. The population and sample of this research are productive vocational high school teachers who teach at the Construction and Property Technology Expertise Program in the province of South Sulawesi. Data collection was carried out in March – June 2021. Determination of the number of samples used the Slovin formula with an error rate of 0.05. The sample used is 59 respondents. The respondents of women as much as 54%, and 46% are male.

The variables observed in this study were the form of the questions, the process of preparing the questions, the teacher's understanding, and the teacher's skills in preparing the HOTS questions. The form of the question is the form of the question that is always made by the teacher in evaluating student learning outcomes. The process of preparing the questions is a step taken by the teacher in compiling the evaluation of learning outcomes. The teacher's understanding is the teacher's understanding of high-level thinking skills. Teacher skills are the teacher's ability to formulate learning outcomes evaluation questions which able to measure students' high-level thinking skills. The research data were analyzed using descriptive analysis and cross tabulation.

The characteristics of the respondents are described as follows Figure 1 (a) shows that the dominant respondents are aged 41-50 years as much as 41%, and the lowest as many as 7% of teachers are respondents who are still less than 30 years old. Figure 1 (b) shows that 63% of respondents are teachers who work for 11-20 years, and

the lowest as many as 2% are teachers who work for more than 30 years.

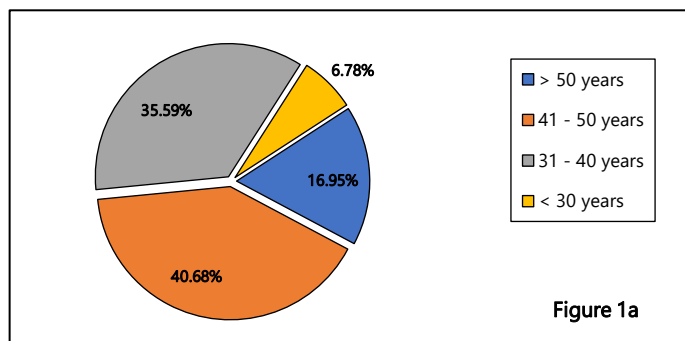


Figure 1a

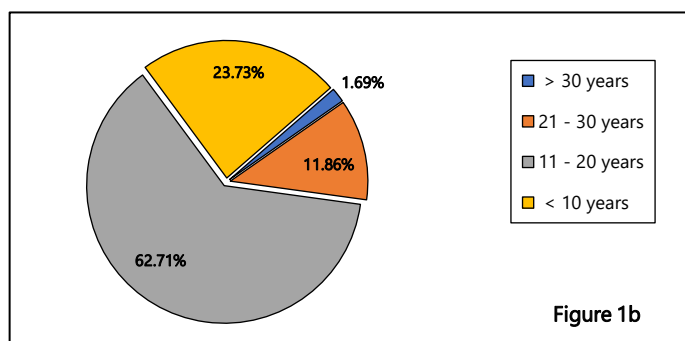


Figure 1b

Figure 1. (a) Age of the Respondent; (b) years of service of the Respondent

### 3. Result and Discussions

#### 3.1. Question Form

The first survey was carried out to find out the form of questions that were most often made by the teacher. The survey results are shown in Figure 2.

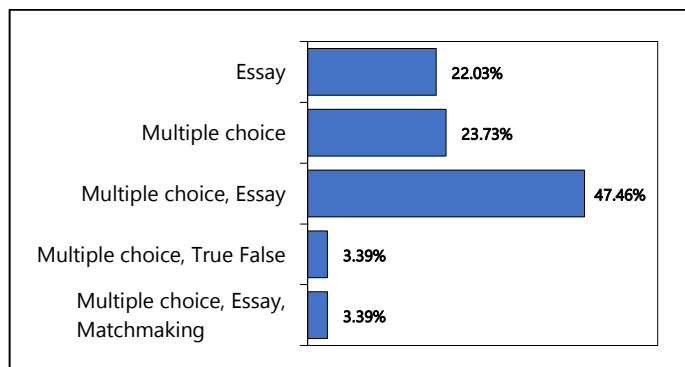


Figure 2. Question form made by the teacher

Figure 2 shows that the dominant teacher makes questions in the form of multiple-choice and descriptions. Meanwhile, the teachers who only used the multiple-choice were 24%, while the teachers who only used the description questions were 22%. The results showed that the dominant teacher combined multiple-choice questions and essays in evaluating student learning outcomes. The

form of evaluation questions for learning outcomes is generally divided into 2 forms, namely objective and subjective tests. The same thing was also found by Arfandi et al., [16] a teacher of the Construction and Property Engineering Skills Program in Makassar City compiled questions in the form of Multiple Choice and Description on the subjects of Construction Fundamentals and Land Measurement Techniques.

Martinez [17] explains that the types of instruments that are often used in learning evaluation are divided into 2 forms, namely objective tests and subjective tests. The form of the objective test consists of 1) multiple choice, 2) true-false choice, 3) matchmaking and 4) short entry. While the kinds of subjective tests there is one, namely the description test (essay). The description test is divided into 2, namely: limited description and free description.

Ahmad's research [18] explains that at the university level most lecturers, especially at the UIN Syarif Hidayatullah Jakarta campus, tend to make final exams questions in the form of descriptions, and very few make final exams questions in the form of multiple choice. Less than half of the lecturers make UAS questions in the form of a mixture of descriptions and multiple choice.

Furthermore, it is explained in Retno's research [19] that the use of multiple-choice test forms in evaluating students' learning outcomes in Physics is more effective when compared to the use of essay tests on students' cognitive abilities in Physics in the Straight Motion sub-subject. Even though, Arnold et al. [20] concluded on the results of his research that the form of test questions had a significant influence on student learning outcomes in accounting subjects.

#### 3.2. Developing question of learning evaluation

As professional educators, teachers must be able to evaluate learning outcomes. The preparation of the evaluation of learning outcomes by teachers is shown in Figure 3.

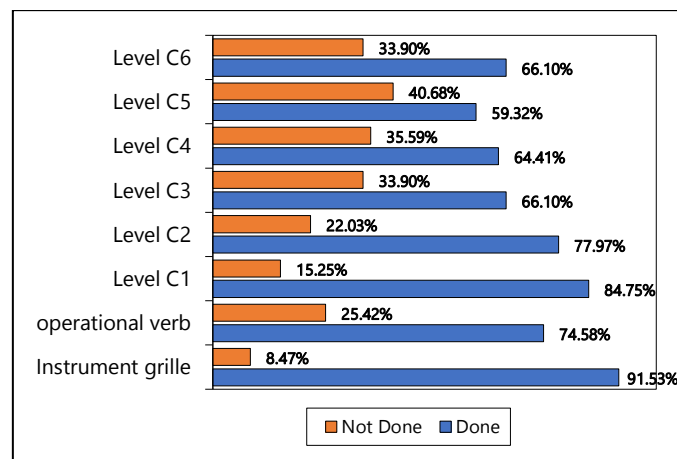


Figure 3. Developing learning evaluation

Figure 3 shows that the dominant teacher has understood the process of preparing the question grid and Bloom's taxonomy. More than 70% of respondents have understood the making of grids before preparing the questions, understood the use of Operational Verbs (KKO), and made questions at the C1 and C2 levels. However, respondents who have not made questions for levels C3 to C6 have not reached 70%.

Based on Figure 3, shows that almost all teachers have understood the process of preparing question grids and Bloom's taxonomy. However, 15% of them do not understand operational verbs (KKO). In making questions, more than 70% of teachers have made questions for cognitive levels C1 and C2. While the questions of cognitive level C3 to C6 are still less than 70% of teachers able to make evaluation questions of learning outcomes.

The results of this study indicate that the teachers of the Vocational High School expertise program have not optimally measured the cognitive levels of students C3 to C6. This is in line with the research of Arfandi et al., [16] which found that in the subjects of Construction Fundamentals and Land Measurement Techniques, teachers of the Construction and Property Engineering Skills Program Vocational High School in Makassar City compiled questions in the form of Multiple Choice and Description. The questions made are dominant in measuring the cognitive levels of C1 and C2.

### 3.3. Teachers' Understanding of HOTS

Along with the implementation of the 2013 curriculum, teachers are expected to be able to change the implementation of learning that is usually teacher-centered into student-centered learning. One form of application of student-centered learning is to provide a stimulus to students in training high-level thinking skills (HOTS). The teacher's understanding of HOTS is described as follows:

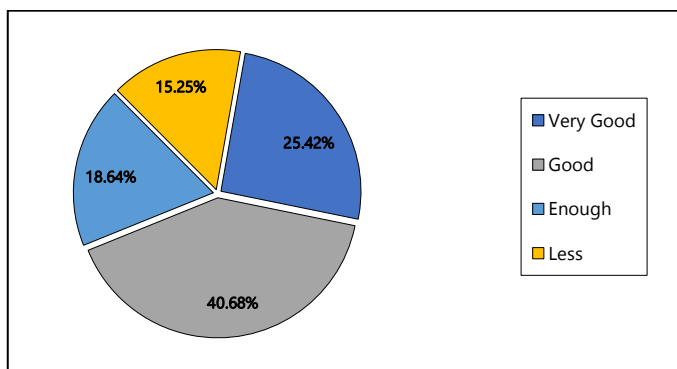


Figure 4. Teachers understanding of HOTS

Figure 4 shows dominant teachers have understood the HOTS instrument in Good Category. in fact, there are

more than 25% have understood it very well. However, there are still quite a lot of respondents who do not understand well the application and how to evaluate the high-level thinking abilities of students.

Based on the results of the study, it was shown that the dominant teacher had a good understanding of high-level thinking skills. However, there are more than 25% of teachers do not understand well. This result is quite different from the conclusion of Arfandi et al., [16] which states that vocational teachers of the TKP expertise program in the city of Makassar do not yet understand HOTS based on evaluation questions made on the basics of construction and land surveying.

Teachers' understanding of HOTS is also related to the implementation of the 2013 curriculum. The results of the research by Rudy Kustijono & Elok Wiwin HM [21] conclude that teachers' views on K13: 1) Teachers are of the view that they do not fully understand the principles of learning; 2) The teachers are of the view that they do not fully understand the principles of assessment; 3) The teachers are of the view that the preparation of the RPP is still constrained; 4) The teachers are of the view that they are still unable to carry out learning activities that are following the standards; 5) The teachers are of the view that they are still unable to carry out assessments according to the assessment standards.

Similarly, the results of research conducted by Zoller show that the ability of chemistry teachers in developing questions is still dominated by elements of Lower Order Thinking Skills. The higher-order thinking ability of students is strongly influenced by learning [22].

### 3.4. Teachers' skill in developing HOTS questioner

The teacher's skill in preparing HOTS questions is measured by asking the teacher to provide questions that have been made by differentiating cognitive levels based on Bloom's taxonomy. The results of the analysis show the following data:

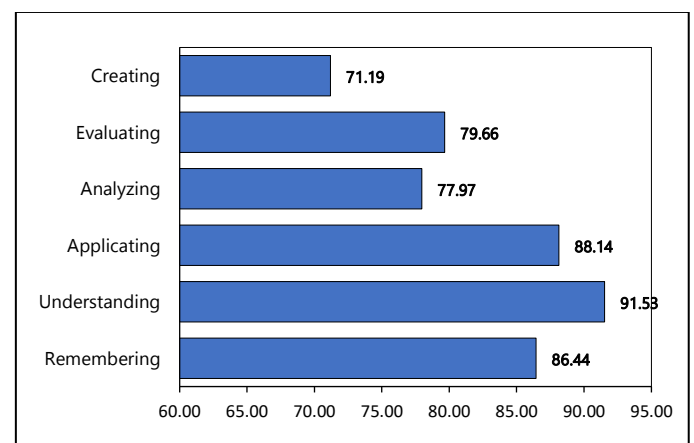


Figure 5. Teachers' skill in developing HOTS questioner

The figure above shows that of the 59 respondents, more than 85% of teachers have skills in making HOTS-based questions at the cognitive level of remembering (C1), understanding (C2), and applying (C3). While at the cognitive level of analyzing (C4), evaluating (C5), and making (C6) teachers who have the skills to make HOTS questions do not reach 80%.

The higher-order thinking skills of students can be developed optimally through learning. For this reason, teachers are expected to apply learning that trains HOTS with Communicative, Collaborative, Creative Thinking, and Critical Thinking (4C) approaches [23].

The results showed that more than 85% of teachers had skills in making HOTS-based questions at the cognitive level of remembering (C1), understanding (C2), and applying (C3), while at the cognitive level of analyzing (C4), evaluating (C5), and making (C6) not reach 80% of teachers who have the skills to make HOTS questions. The results of the research by Ramadhana show that about 30 percent of questions were found in the tests which include High Order Thinking Skills [24].

### 3.5. Teachers' skill in developing HOTS questioner based on years of service

The skills of teachers in preparing HOTS questions based on years of service are shown in Figure 6. The tenure of teachers is divided into 4 (four) parts, namely less than 10 years, between 11-20 years, between 21-30 years, and more than 30 years. More details be follows:

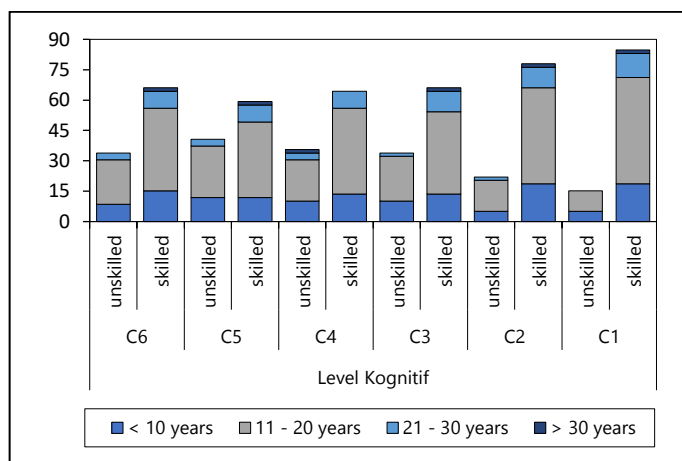


Figure 6. Correlation of teacher skill and years of service

From Figure 7, information is obtained that more than 50% of teachers have been skilled at making HOTS questions regardless of their working period. Teachers with a working period of 11-20 years are seen to be more dominantly skilled in preparing questions. More than 50% of these teachers have the skills to compose cognitive level questions C1 to C6. Teachers with a working period of fewer than 10 years are dominantly skilled in preparing

questions C1 and C2, while teachers with a tenure of 21-30 years are almost evenly distributed at every cognitive level but do not reach 20%. Meanwhile, teachers with more than 30 years of service did not reach 10%, because the number of teachers who became respondents was also very small.

Based on the results of the study, it shows that teachers with a working period of 11-20 years are more dominantly skilled in preparing HOTS questions and are almost evenly distributed in each preparation of cognitive level questions. The same thing is shown by teachers with 21-30 years of work. This is almost in line with the research of Darling [25] which describes that teachers with a working period of 21 years and over often make exam questions in the C3 cognitive domain. Another conclusion expressed is that there is a significant influence between the tenure and professionalism of the teacher on the types of exam questions made by the teacher. In addition, it was also concluded that there was a significant effect between the types of exam questions made by the teacher on the students' thinking level.

## 4. Conclusion

Based on the results of the analysis of the application of High Order Thinking Skill (HOTS) on exam questions at the Construction and Property Engineering Skills Program Vocational School in Makassar City in the subjects of Construction Fundamentals and Land Surveying Techniques, it is concluded that: 1) The form of learning outcomes evaluation questions made by the teacher combines the form of objective tests and subjective tests. Objective tests are carried out in the form of multiple-choice, and subjective tests are given in the form of description questions. 2) Vocational teachers of the construction and property technology expertise program prepare questions by first creating a grid of questions, then dividing the categories of questions based on their cognitive level. However, the selection of KKO still needs to be strengthened and improved understanding. 3) Dominant teachers have understood the preparation of questions that measure high-level thinking skills, however, almost 40% of teachers still need to strengthen their understanding of HOTS-based question preparation. 4) Dominant teachers have been skilled in preparing HOTS questions, however, there are still 20% of teachers who still need assistance in preparing HOTS-based questions. and 5) Teachers with a working period of 11 – 20 years are more dominantly skilled at preparing HOTS questions.

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