

A Review Of Metacognition And Science Literacy Skills Toward The Students Of Smk Andalusia 1 Wonosobo

Akhmad Sukron Khafifi¹, Riskana br Sitepu², Agus Yulianto³, Masturi⁴
{sayasoekron@yahoo.com¹, riskanasitepu17@gmail.com², yulianto566@mail.unnes.ac.id³,
masturi@mail.unnes.ac.id⁴}

SMK Andalusia 1 Wonosobo, Jl Kertek Km.05 Wonosobo¹,
Universitas Negeri Semarang, Jl Kelud Utara III
Semarang^{1,2,3,4}

Abstract. Metacognition and literacy skills are important in the 2013 curriculum because both things belong to 21st century expertises. The purpose of this study is to determine the metacognition and scientific literacy skills of the students in SMK Andalusia 1 Wonosobo in the 2018/2019 teaching year. This study uses a quantitative method with a descriptive approach. The results of the research show that students' metacognition abilities are still relatively low, especially in monitoring and evaluation indicators. Meanwhile, the scientific literacy skills shows that the average achievement reaches up to 89% in knowledge aspect. The results of these studies indicate that the results between metacognition skills are different from the scientific literacy ones. These results can also be used as a reference for developing better competencies by improving or creating innovations in the classroom learnings.

Keywords: Metacognition, Scientific Literacy.

1 Introduction

The current development requiring human resources in a country especially Indonesia should be superior and able to adapt to existing developments. One of the efforts to improve these human resources is by building education in all existing education levels, including vocational education unexceptionally in Vocational High Schools. It is stated in the 15th chapter No. 20 in 2003 explaining that vocational education is a secondary education which prepares students primarily to work in certain fields. It means that it is one of the government efforts to improve human resources.

The graduate competency standard of vocational school education is the criteria of SMK graduates abilities to cover aspects of attitudes, knowledge, and skills in accordance with their fields and scope of work [1]. The standard aspects of knowledge are about factual, conceptual, procedural, and metacognitive thinking in accordance with the field and work environment which are related to science and technology, arts, culture, and humanities in the context of their own potential development. Metacognitive learning is one of the things that must be achieved in learning activities [2]. Metacognitive skills arise from meaningful experiences through scientific activities in learning activities.

Metacognitive as a goal of developing education is valuable because it can create students become independent (self-regulated learners) [3]. Metacognitive are awareness, consideration and self-monitoring of the students' processes [4]. Metacognitive is also interpreted as a second

order cognition which has the notion of thinking about thinking, knowledge of knowledge, or reflection on actions [5]. Students who have high metacognitive abilities will have higher learning outcomes and academic achievement compared to students who have low ones [6].

The Organization for Economic Co-Operation and Development (OECD) describes the ability to explain natural, technical, and technological phenomena and implications for society. Not only those, but also how to make representation to justify correct predictions and hypotheses, and to explain the potential implications of scientific knowledge for society [7]. *The Program for International Student Assessment* (PISA) is a literacy study conducted by *OECD* and the *UNESCO Institute for Statistics*. This program aims to periodically analyse at the international level students' literacy abilities in aspects of reading, mathematics, and scientific literacy.

Indonesia is one of the participating countries participating in literacy studies conducted by PISA. The average score of Indonesian scientific literacy based on the results of the PISA study in 2000, 2003, 2006, 2009 and 2012. According to the Ministry of Education in 2011, Indonesia ranked 38 out of 41 countries, 38 of 40 countries, 50 of 57 countries, and 60 of 65 countries [8]. The concept of scientific literacy aims to have a high sense of concern for themselves and their environment in dealing with the problems of everyday life and make decisions based on the scientific knowledge they have understood [9].

The scientific literacy in PISA 2012 is: (1) individual scientific knowledge and the ability to use their knowledge to identify problems, acquire new knowledge, explain scientific phenomena, and draw conclusions based on evidence related to scientific issues; (2) understand the main characteristics of knowledge built on human knowledge and inquiry; (3) realize how science and technology form material, intellectual and cultural environments; (4) the willingness to engage in issues and ideas related to science [10].

Based on the explanations above, the skills of metacognition and scientific literacy have a large role in education. The purpose of this study is to determine the level of metacognition and scientific literacy skills of the 12th grade students in SMK Andalusia 1 Wonosobo. Thus, the results can become a reference to improve education and of human resources qualities in Indonesia, especially SMK Andalusia 1 Wonosobo students.

2 Method

2.1 Sample characteristics and sampling method

The samples are taken by random sampling in SMK Andalusia 1 Wonosobo. The subjects of this study are 19 students from one class [11].

2.2 Research Design

The research method used in this study is a type of descriptive research method with a qualitative approach. The main objective in descriptive research is to explain in an integrated, real, and accurate manner about the facts and the nature of the population in a particular area [12].

2.3 Data collection

The procedure of research is carried out through several stages starting from the pre-field stage, the work phase, and the data analysis stage. The activities carried out at the pre-field stage are compiling instruments of metacognition and scientific literacy skills and then asking permission from the school to provide research instruments to students. The activity at the field stage is to give questionnaires about scientific literacy metacognition skills to the tested subjects. And the last stage is the analysis phase which is to analyse the results of the answered questionnaires. The main instruments in this study are questionnaires on the skills of metacognition and scientific literacy. The metacognition skills questionnaire consisted of three indicators of metacognition skills and contained sixteen statements that had been consulted and validated by two validators, one validator of the supervisor, and one validator from the teacher of physics studies at SMK Andalusia 1 Wonosobo. The questionnaire or questionnaire form was given using a likert scale with a scale of 1-5.

This research is conducted by giving science literacy tests on aspects of knowledge and scientific competence in the form of multiple choice test questions on the scope of kalor materials to the 19 of 12th grade students who have obtained the concept of kalor materials. This test is completed in 30 minutes This literacy test has been validated by five expert lecturers with qualifications in each field of science. In addition the question instrument validation process was carried out by testing the questions which were then analyzed using the Anates V4 application program to find out the validity, reliability, different power, and difficulty level of the questions.

2.4 Analysis

Data on metacognition skills is processed using the percentage of skills of each indicator. The percentage of achievement of each metacognition indicator is as follows:

$$P = \frac{A}{n} \times 100\% \quad (1)$$

P = percentage of indicators of metacognition ability

A = many students have met metacognition ability indicators

n = many test subjects

The percentage of fulfillment of each indicator of the skills of metacognition is as follows on table 1. :

Table 1. Percentage of metacognition skills level score.

Percentage of scores achieved	Category
$P \geq 75 \%$	High
$50 \% \geq P \leq 75 \%$	Medium
$P \leq 50 \%$	Low

From the table. 1, it can be shown that the students achieve different level of metacognition skills in each indicator. The average percentage of students' metacognitive skill scores is below 50% which means that it is still in low category and it needs improving [13].

Data on scientific literacy skills was analyzed by calculating the percentage of scientific literacy achievement in the aspects of science and science competency aided by Microsoft Office Excel programs as follows on table 2.[14]:

Table 2. The Student's learning result criteria

Score	Criteria
80-100	Very good
66-79	Good
56-65	Intermediate
40-55	Bad
30-39	Very bad

3 Result and Discussion

The results of research on metacognition abilities and scientific literacy were obtained from questionnaires and questions on 19 XII grade students of SMK Andalusia 1 Wonosobo as follows on table 3 and 5:

Table 3. Percentage of metacognition skills level score

No	Indicator	Percentage of Metacognition Ability Level Score				
		score 5	score 4	Score 3	score 2	score 1
1	Planning	17%	20%	33%	25%	5%
2	Monitoring	8%	27%	38%	22%	5%
3	Evaluating	5%	22%	42%	21%	9%

In this table we can see that the level of student achievement on indicators of different levels of metacognition ability. In the first indicator, the planning indicator, the average percentage score of students 'metacognition ability is below 50%, which means that the students' metacognition ability in planning indicators is still relatively low and needs to be improved. In the second indicator, which is the monitoring indicator, the average percentage score of students 'metacognition abilities is below 50%, which means that the students' metacognition ability in planning indicators is still relatively low and needs to be improved. In the third indicator, the evaluation indicator, the average percentage of students 'metacognition ability scores is below 50%, which means that the students' metacognition ability in planning indicators is still relatively low and needs to be improved

From the result data of scientific literacy on knowledge and science competence aspects above, it is interpreted based on the student's learning result criteria for every indicator overall.

Table 4. Results of Science Literacy Skills

Number of Question	No	Percentage
1	16	84%
2	16	84%
3	15	100%
Average		89%

Note:

N : The number of students who answered correctly

% : Percentage of students who answered correctly

Based on the table 5, it can be shown that the average achievement of literacy skills in the overall on knowledge and competence aspects is **89%** in very good category which is 'very good' achievement. Furthermore, it can be explained from table 4 that there are three 'very good' achievement category questions which can be answered by the students.

Based on the result data above, it can be concluded that there are some differences results between metacognition and scientific literacy skills. These results can also be used as a reference for developing better competencies by improving or creating innovations in the classroom learnings.

4 Conclusion

Based on all data results conducted by the researcher, it can be summarised that the average scientific literacy skills of SMK Andalusia 1 Wonosobo students in the overall aspects both from knowledge and competence is 89% with the achievement category "very good" scores. On the other hand, they have low category for metacognition skills. This can be seen from the percentage of students metacognition skills level and average score, especially on monitoring and evaluating indicators

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