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Reflective Thinking Profile for Junior High School Students in Service Learning-based Science

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Abstract. This study aims to determine the reflective thinking profile of junior high school students who are taught with service learning in science learning for the topic of Digestive Systems. The design of this research is descriptive research. The research subjects were 32 students of grade VIII B of SMP N 1 Mlati, Indonesia. The instruments used were the reflective thinking questionnaire and reflection column sheet. The analysis technique used is descriptive analysis and gain score. The results of this study are the reflective thinking aspects of students can be developed through science learning based on service learning. The lowest results of the reflective thinking aspect questionnaire are mastered by students in the form of the ability to connect between problems in life with the content of science, while the highest is the ability to recognize problems.

Keywords: Science; Reflective Thinking, Service Learning

1. Introduction

Education is an important element as a matter of priority to be able to prepare Human Resources ready to compete in the MEA era, which is expected to form a whole human being [1]. In addition, education reform encourages learning to be meaningful learning rather than rote learning. The learning process of students must be able to build the learning experience of students based on what students do during learning. Therefore, there is a need for reflection after the learning is done so that students can learn better. One of them is by developing reflective thinking on students. As Pavlovich, *et al.* in [2] suggests that the question "Who" will encourage someone to reflect on the actions of individuals to sense and learn from what they perceive and experience.

Learning Science is the interaction between learning components in the form of processes. Development in the world of education as experienced today requires an increase in the learning process. To be able to deal with the 21st-century students are required to be able to link between material learned with real life. Reflective thinking is important because it can train students to try to connect the knowledge gained to solve a problem with their old knowledge. Given the importance of reflective thinking, it needs to be developed, including in science learning.

One of the efforts to be able to teach reflective thinking to students in science learning is by implementing service learning. This is because service learning is designed to make learning material related to overcoming real problems in life, which are essential components of the curriculum [3]. Service learning requires higher order problem-solving skills, giving students the opportunity to use their knowledge in different ways and be actively involved with all their senses.



So far service learning is still not familiar to be applied in science learning. Several studies have investigated the effect of service learning on reflective thinking, but have not revealed in detail the description of what reflective abilities can be developed. Therefore, it is important to be revealed about how reflective thinking of students in science learning is based on service learning.

The rest of this paper is organized as follow: Section 2 presents a brief literature review. Section 3 describes the proposed research method. Section 4 presents the obtained results and following by discussion. Finally Section 5 concludes this work.

2. Related Works

Sezer points out that students can think reflectively and consciously and control learning actively to assess what is known, what is needed to know, and how to bridge if there is a gap [4]. Gurol in [5] defines reflective thinking as a process of directed and precise activities where individuals analyze, evaluate, motivate, get the deep meaning, use appropriate learning strategies. Thus reflective thinking aims to achieve learning targets and produce new learning that has a direct impact on the learning process. Reflective thinking is defined as an awareness of what is known and what is needed, it is very important to bridge the gap in the learning situation. Jacquelyn in [6] suggests that reflective thinking includes five indicators:

- a. Expressing awareness of problems.
- b. Express the relationship between the concept of learning and experience.
- c. Problems are solved based on insight and experience.
- d. Problems that are solved can be evaluation material.
- e. Bring up analytical skills:

Reflective thinking is thinking that is aware of its own assumptions and implications so that it becomes aware of the reasons and evidence that supports the conclusions. Reflective thinking considers its own methodology, procedures, perspectives, and point of view. Reflection thinking is prepared to know the factors that make bias and bad prejudices from within. Reflective thinking includes recursive thinking, metacognitive thinking, self-correction thinking, and all other forms of thinking [7]. Kosslyn in [8] said that reflective thinking is useful not only as a way of remembering information or making new decisions but also as practicing what has been decided as an improvement that will be carried out next.

Service learning in theory and practice adapts Kolb's learning cycle in the form of concrete experience, cognitive reflection, abstract theorization, and experimentation to generalize knowledge and facilitate learning in various contexts. Presenting a physical environment in the form of authentic environments, service-learning simplifies Kolb models by encouraging some form of structured reflection to link experience with concepts, ideas, and theories and generalize new things and application of knowledge in real-world situations [9].

Eyler, et *al.* in [10] state that service learning has a positive effect on students' personal and interpersonal development, including a sense of personal identity, spiritual growth, moral development, the ability to work well with others, and leadership and communication skills. Corporation for National & Community Service in [11] states that research results show high-quality service-learning to improve academic achievement, tighten relationships between students and society, and reduce the deviant behavior.

3. Material & Methodology

This section presents the material used and the proposed methodology.

3.1. Data

The data in the study were obtained in the form of quantitative data from students' responses, and the assessment of reflex columns. The response of students is done by calculating the average score,

the average score is then converted to a scale of four. The reflection column is analyzed descriptively, the average score and scale conversion are 5.

3.2. Method

This research is a type of descriptive research to describe the reflective thinking ability of junior high school students in natural science learning through service learning. The study was conducted at Mlati 1 Public Middle School, Sleman Regency, Yogyakarta Special Province, Indonesia. The study was conducted in November 2016. The research subjects were 32 students of Class VIII-B Mlati 1 Public Middle School. The data was collected using a reflective thinking questionnaire. In addition, reflective thinking ability is also observed based on the students' writing in the reflection column at the end of each learning sub-topic.

The questionnaire results were then analyzed descriptively, using the conversion score to a scale of 4 and qualitatively categorized is shown in Table 1 below:

Table 1. Convert score to value on scale four

No	Score Range	Value	Category
1	$X \geq X_i + 1.SB_i$	A	Very Good
2	$X_i + 1.SB_i > X \geq X_i$	B	Good
3	$X_i > X \geq X_i - 1.SB_i$	C	Enough
4	$X < X_i - 1.SB_i$	D	Less

Data from the reflection column are analyzed in the following way:

- To recapitulate each student's answer in the reflection column.
- To assess the answers of students referring to reflective thinking indicators if the answer meets one of the reflective thinking indicators the value is 1 while if it does not meet its value 0.
- To calculate the number of scores for each meeting.
- To calculate the average of each meeting.
- To calculate the percentage of scoring results from each meeting using the equation (1):

$$\bar{X} = \frac{\sum S_i}{s} \times 100\% \quad (1)$$

Where:

\bar{X} = percentage of score

$\sum S_i$ = the sum of score achievement

s = maximal score

The percentage of reflective thinking results of students through the reflection column assessment at each meeting are obtained in the form of quantitative data which is then converted into qualitative data using the scoring guidelines in Table 2.

Table 2. Percentage reflective thinking ability based on reflection column

No.	Mastery Level(%)	Grade	Category
1	$85 < X \leq 100$	A	Very Good
2	$75 < X \leq 85$	B	Good
3	$65 < X \leq 75$	C	Medium
4	$55 < X \leq 65$	D	Less
5	$X \leq 55$	E	Poor

4. Results and Discussion

The students' responses regarding the reflective thinking ability of science learning using questionnaires. This questionnaire is given to students at the end of learning. The questionnaire consists of 10 statements consisting of positive statements and negative statements. The response

questionnaire made by students contains reflective thinking indicators which include: expressing awareness of the problem, expressing the relationship between the concept of learning and experience, the problem solving based on insight and experience, the problem solved can be an evaluation material and the analysis ability. Each score given by students is then analyzed per item and per indicator shown in Table 3 below:

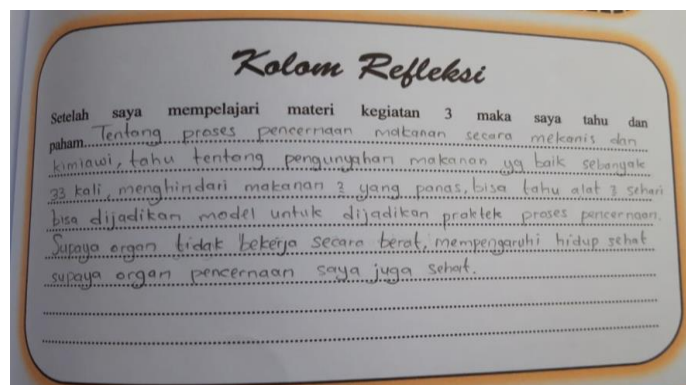
Table 3. Learners' response results data viewed from reflective thinking aspects

No	Indicator	Percentage (%)
1.	Expressing awareness of problems	81,64 (Very Good)
2.	Expressing the relationship between the concept of learning and experience	68,36 (Good)
3.	Solving problems based on insight and experience	77,34 (Good)
4.	Solving problems as an evaluation material	74,22 (Good)
5.	Bring up analytical skills	78,13 (Good)
	Mean	75,94 (Good)

Table 3 shows that the reflective thinking aspect is in the form of expressing the lowest relationship between the concept of learning and experience. This is because students are still not accustomed to being taught contextually by confronting problems in daily life to be associated with science content. In addition, this ability requires high-level thinking skills, namely analysis. The ability of students to realize the problem is very good. This is evident when students at the beginning of learning from the ability of students in explaining the identification of facts that have been done, explaining the identification of questions that have been done, explaining how to check the adequacy of data.

The data from the reflection column is obtained from the results of the assessment of each student's answer in the reflection column that has been provided at the end of each activity. The answers from each student are then assessed using a reflective thinking indicator reference which consists of expressing awareness of the problem, expressing the relationship between the concept of learning and experience, the problem solving based on insight and experience, the problem solved can be an evaluation material, and raises analytical skills. The assessment is the value of 1 if the answers of students meet the indicators of reflective thinking, and the value of 0 if the answers of students do not meet the indicators of reflective thinking. Students' answers in the reflection column can be exemplified as follows (Figure 1).

Example work in a reflection column (in Indonesian language)



Examples of work in a reflection column (in the English language)

After I learned the Activity 3 material, therefore I knew and understood about the process of digestion of food mechanically and chemically, and also I understood about a good way of chewing food that is

about 33 times, avoiding hot foods, being able to identify the tools in everyday life that can be used as a model for the digestive process practices. So that the organs do not work heavily, then applying a healthy life which can also nourish the digestive organs is urgently necessary.

Figure 1. Student work results in a reflection column.

Data on mastery of reflective data is presented in Table 4.

Table 4. Percentage of Reflective Thinking Mastery

Meeting	Reflective Thinking Mastery Level (%)	Category
1	48.75	Less
2	65	Medium
3	98.75	Very Good

Broadly speaking, the condition of reflective thinking ability of students before being treated is still very lacking, but when these reflective thinking indicators are continuously applied in learning, the reflective thinking ability of students automatically increases. Thinking reflective ability is important for students because it can make learning that has been done become more meaningful. Service learning can also develop reflective thinking skills.

5. Conclusion

This paper has presented reflective thinking profile for junior high school students in service learning-based science. Based on the results of the study, it can be concluded that the reflective thinking material of the Digestive System has a response from students with an average value of 75.94% with good categories, and the reflection column at meeting 1 to meeting 2 has increased by 16.25% from 28.75% to 65% of the category less to the category enough, meeting 2 to meeting 3 increased by 33.75% from 65% to 98.75% from the category enough to the category very well.

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