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Self-Regulated Learning Ability of Elementary School Students in Learning Mathematics

Self-Regulated Learning Ability of Elementary School Students in Learning Mathematics

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Abstract. The purpose of this study was to describe the self-regulated learning ability of elementary school students in learning mathematics. It was conducted on 284 fourth-grade elementary school students. Respondents were chosen based on the same characteristics, which are the same curriculum, grade and age range. Data were collected from students' responses using the questionnaires. This research was a quantitative descriptive with survey-design research type. The result showed that the ability of self-regulated learning students was various. Self-regulated learning ability of the students were distributed as 15% (very high category), 25% (high category), 59% (medium category), 0,4% (low category) and 0,4% (very low category). Based on the results of this study, the self-regulated learning ability of fourth grade of elementary school in learning mathematics is in the moderate category.

1. Introduction

Education and learning are two closely interconnected objects. One of the main aspects of the education world is learning activities. A good learning activity will be realized if there is synergy between teachers and students as the education stakeholders. Teachers have roles to design well the way of learning in order to provide the meaningful experiences for students in each lesson, so that can permanently contribute, both in terms of students' knowledge, behavior and thinking ability [1]. Meanwhile, the role of students is how to get good self-regulation for controlling themselves and emerge the awareness to be active-reactive in the learning process and also have the responsibility toward the success of desired goals.

Based on [2], year 1, 2, and 3 children were able to indicate that there are foundational aspects of self-regulated learning through the appropriate teacher's orientation and support. Accordingly, self-regulated learning needs to be instilled in early childhood. It is aimed to require students to take responsibility for their learning so as to have targets and learning goals and can determine the steps to achieve those goals. Good self-regulated learning can encourage success and improve students' achievement proactively with strategies for desired goals [3].

Self-regulated learning ability is very important for students to comply with every learning, especially in learning mathematics. Mathematics learning is faced with the challenges to solve the complex and non-routine problems [4]. The use of strategies, the preparation of solution steps, and strong motivation are necessary to be able to solve mathematics problems precisely. It shows that there are three phases of self-regulated learning in the learning process, including processes and beliefs that occur before beginning to learn (forethought), the process during the learning activity occurs (performance), and the process that occurs after learning (self-reflection) [5]. Components in the three phases of SRL are shown in Figure 1 below [6].

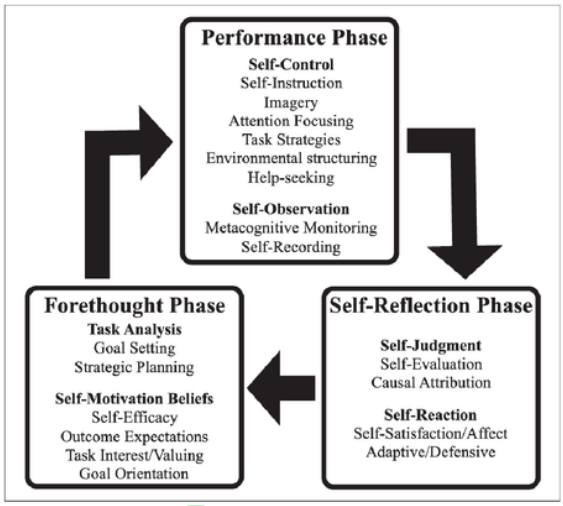

Figure 1. Self-regulated Learning Phase

In the planning phase, there are two related categories, namely task analysis, and self-motivation beliefs. Task analysis includes goal setting and strategic planning. Goals can be interpreted as the establishment or determination of the learning outcomes that an individual wants to achieve. Furthermore, strategic planning is a process and action of someone who aims and oriented for obtaining and demonstrating a skill that can be used to achieve goals. On self-motivation beliefs phase leads to how far students understand the lessons or the skills that they are learning, how far students assess the lesson or skills that they are learning, students' perceived self-efficacy and the goals or reasons students adopt for wanting to complete academic tasks have often been used to understand and explain students' motivation and concomitant effort and persistence for academic tasks [7].

On performance phase, there are two categories, namely self-control, and self-observation. Self-control in self-regulated learning is how students avoid distraction from interruption, focus on learning, and use time effectively, which were found to be important for students' learning [8]. While self-observation is students' responses that involve systematically monitoring their own performance. Observing oneself can provide information about how well one is progressing toward one's goals including self-recording to personal events and self-experimentation in order to find out the causes of the events that occur [9].

Self-reflection phase sets in efforts for comparing the obtained information through self-monitoring with predetermined standards or objectives, beliefs about the causes of strides or errors, enhancement of self-satisfaction and protection of self-image by withdrawing or avoiding opportunities to learn.

Some researchers found that the self-regulated learning ability of students on the university and high school are at the different levels. [10] showed that the understanding level of self-regulated learning of students in the department of elementary school teacher education is on a high level. Then, [11] showed that the self-regulated learning ability of 258 high school students whom 43.03% of respondents liked mathematics are 23,64% students have low self-efficacy, 57,75% students have high self-judgment and 56,60% students have a high level of anxiety toward mathematics achievement. Different self-regulated learning ability profile in each university students is demonstrated by research from [12], that there are five profiles of self-regulated learning: super self-regulators, competent self-regulators,

forethought-endorsing self-regulators, performance/reflection self-regulators, and non-self-regulator or minimal self-regulators, and they significantly influence their academic achievement. Based on the explanation from some relevant studies, self-regulated learning ability had actually belonged to each individual, even since the individual is in year 1. However, the difference is the level of self-regulated learning ability of each individual. Therefore, this study was conducted to determine the profile of self-regulated learning ability of elementary school students in learning mathematics.

From the above descriptions, the purpose of this research was to describe the category of students' self-regulated learning ability in learning mathematics. This study is required to allow follow-up or suitable treatments in order to develop students' self-regulated learning ability.

2. Method

This study is a quantitative descriptive research to describe the category of students' self-regulated learning ability in learning mathematics. It was held on 284 fourth-grade of an elementary school student in Bantul District, Yogyakarta. Samples were chosen from five public elementary schools with the same characteristics, namely applying curriculum 2013, the same grade and relatively the same age range from 9-11 years. Data were collected from students' responses using the questionnaires and measured by the Likert-type scale. It is in line with the explanation of [13] that the self-regulated learning questionnaire will be better if the response's item uses scale-type. Subsequently, questionnaires were analyzed by calculating questionnaire scores, determining the category of the measurement result, and grouping the students into several categories. To determine the category of students' self-regulated learning ability, it is shown in Table 1 [14].

Table 1. Measurement scale of students' self-regulated learning ability category

Interval	Category
$M_i + 1{,}5\ S_i < X$	Very High
$M_i + 0{,}5\ S_i < X \leq M_i + 1{,}5\ S_i$	High
$M_i - 0{,}5\ S_i < X \leq M_i + 0{,}5\ S_i$	Moderate
$M_i - 1{,}5\ S_i < X \leq M_i - 0{,}5\ S_i$	Low
$X \leq M_i - 1{,}5\ S_i$	Very Low

Labels:
X : students' self-regulated learning ability score in each respondent
M_i : mean score of students' self-regulated learning ability
S_i : standard deviation of students' self-regulated learning ability

3. Result and Discussion

The result of students' ability was various on the three phases of self-regulated learning included the phase of forethought, performance, and self-reflection. The results of the average of phase forethought students' self-regulated learning ability on each phase will be demonstrated in Table 2.

Table 2. The average score of self-regulated learning ability on forethought phase

Indicator	Sub-Indicator	Average of Sub-Indicator
Task Analysis	Goal setting	2,3
	Strategic planning	2,1
Self-Motivation Beliefs	Self-efficacy	3,2
	Outcome expectations	3,2
	Intrinsic interest	2,8
	Learning goal orientation	2,5

Table 2 shows that the self-motivation beliefs indicator with the intrinsic interest sub-indicators of the forethought phase has the highest average among the other sub-indicators. Based on these two indicators, the average task analysis indicator is 2.2 and self-motivation beliefs is 2.92. In another word,

in the forethought phase, students are more prominent in the self-motivation beliefs indicator than the task analysis indicator. Next, the average indicator of the performance phase will be shown in Table 3.

Table 3. The average score of self-regulated learning ability on performance phase

Indicator	Sub-Indicator	Average of Sub-Indicator
Self-Control	Imagery	2,9
	Self-instruction	3,4
	Attention focusing	3,4
	Task strategies	3,5
Self-Observation/Monitoring	Self-recording	2,9
	Self-experimentation	2,8

Table 3 shows that in the performance phase, the task strategies sub-indicator is the highest average among the other sub-indicators. From the self-control and self-observation / monitoring indicators, each is known to have an average of 3.3 and 2.85. Based on the average, it is known that the student performance phase is more prominent in the self-control indicator. Next, the average of each indicator for the third phase is shown in table 4.

Table 4. The average score of self-regulated learning ability on the self-reflection phase

Indicator	Sub-Indicator	Average of Sub-Indicator
Self-judgment	Self-evaluation	2,6
	Causal Attribution	2,5
Self-Reaction	Self-satisfaction/affect	2,9
	Adaptive/defensive	3,1

Table 4 shows that the self-reflection phase with the adaptive/defensive sub-indicator has the highest average. From self-judgment and self-reaction indicators, students are more prominent on the self-reaction indicator with an average of 3.0. The average of the self-judgment indicator is 2.55.

Based on the calculation of the average of each phase of self-regulated learning, it is known that the phase of performance is the most prominent phase between the forethought and self-reflection phase, ie with an average of 3.15, while the forethought phase shows an average of 2.68 and a self-reflection phase with an average of 2.78.

These three phases are cyclical, so they are interconnected and sustainable. Self-regulated learning will grow well if initiative emanates out of student's own sheer will to be able to awaken learning motivation in such a way that it can affect thoughts, feelings, strategies, and behaviors for the achieved goals [15]. Motivation is a major factor to initiate in action or effort that comes from inside and outside of the self, which it can be a reward or punishment [16]. Several studies have also shown that self-regulated learning and motivation are closely related to each other [17].

Then, for the levels of the category of self-regulated learning ability level of elementary school students will be demonstrated in Table 5 below.

Table 5. Self-regulated learning ability of elementary school students category

Interval Score (X)	Category	Frequency	Percentage (%)
$117 < X$	Very High	43	15
$99 < X \leq 117$	High	72	25
$81 < X \leq 99$	Moderate	167	59
$63 < X \leq 81$	Low	1	0,4
$X \leq 63$	Very Low	1	0,4

Table 5 showed that the percentage of self-regulated learning ability categories of elementary school students are 43 students (15%) with “Very High” category, 72 students (25%) with “High” category, 167 students (59%) with “Moderate” category, and 1 student (0,4%) with “Low” category as well as “Very Low” category.

The levels of self-regulated learning ability of elementary school students are affected by some factors, including personal, behavioral, and environmental factors which they are dynamic during the learning process [18]. Personal factors are related to students' self-confidence in the learning process. The perception of students' self-efficacy depends on four types that affect a person's self. They are students' knowledge, the process of metacognition, purpose, and effect. Furthermore, the environmental factor concerns the social experience of student learning through direct experience and task management or learning situations. On behavioral factor, it is related to monitor students on their own performance and systematically comparing their efforts to certain standards. In addition, students are able to respond to their own learning attitudes.

Self-regulated learning ability begins with self, it is called personal factors. Personally, it means that students must be able to observe, assess and react to their own condition properly [19]. Self-regulated learning is not a personal style or trait that can not be controlled by students, but students can control their behavior, motivation and affect, and cognition in order to improve their academic learning and performance [20].

4. Conclusion

Based on the results of this research, it is known that the level of self-regulated learning ability of fourth-grade elementary school students in learning mathematics is on the moderate category and from the three phases of self-regulated learning, students are more prominent on the performance phase. In order to develop self-regulated learning in students, teachers have an important role in providing motivation for the achievement of student learning goals [21]. In addition, knowing the level of self-regulated learning ability of students, teachers can assist them in the different treatments such as applying the appropriate model and strategies of learning-teaching, preparing and providing the proponent assignments to strengthen self-regulated learning ability of students.

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7