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ANALYSIS OF UNDERGRADUATE STUDENTS' METACOGNITIVE AWARENESS BASED ON CLASS LEVEL

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Abstract

Metacognitive awareness is essential not only for school level learners, but also for higher level students. They are still experiencing the process of learning and the assumptions about what they learn still exist in their minds. Therefore it can lead to metacognitive awareness with different levels. However, metacognitive awareness based on class level is still yet to be explored. In this study, the level of undergraduate students' metacognitive awareness according to class level was identified. The participants were 31 college mathematics education students per group from first, second, and third-years at a state university in Indonesia. The data were collected through the Metacognitive Awareness Inventory. The data were analyzed as numbers, mean scores and percentages on every participants. The findings showed that class level had no effect on level of students' metacognitive awareness. It also indicated that although there are no students who have very low metacognitive awareness, but the higher the class level, the lower their average of

metacognitive awareness. These findings suggest that there should be attention from teachers as well as efforts to enhance students' metacognitive awareness.

Keywords

Metacognitive Awareness, Metacognition, Knowledge about Cognition, Regulation about Cognition, Class Level

1. Introduction

Metacognitive is one of the important aspects of 21st century skills that students need to be taught. Through this ability, students should be able to build strong content knowledge by responding to varying demands of audiences, tasks, purposes, and disciplines by critically synthesizing different resources and valuing sound evidence (Ozturk, 2017). In fact, Singapore, which is one of the countries with the best education system, has placed the importance of metacognitive in the Singapore Mathematics Curriculum since 1992 (Hoe, Cheong, & Yee, 2001). Therefore, metacognitive not only need to be possessed by students at elementary and secondary level, but also need to be studied by higher level students.

Metacognitive is often defined simply as "thinking about thinking" or the ability of a person to know what is known, what is unknown and how to organize as well as regulate his thinking (Mahdavi, 2014). According to De Corte (Toit & Kotze, 2009) metacognitive is a cognitive knowledge and belief that allows one to manage his cognitive processes. Metacognitive involves activities such as planning how a task can be done, monitoring the level of understanding and evaluating the progress of the task at hand (Chauhan & Singh, 2014).

In addition, Ormrod in Young & Fry (2008) argues that metacognitive can be defined as what one knows about its cognitive processes and how to use these cognitive processes to learn and remember. Metacognitive is one's awareness of how he or she learns and what he does (Flavel in Tok, et al., 2010). According to Gopinath (2014) metacognitive involves at least two components, namely (1) an awareness of the abilities, strategies and resources needed to perform a task effectively, knowing what is done, and (2) the ability to use self-regulatory mechanisms to convince the successful completion of a task, knowing how, when and what to do.

Based on the above definitions, metacognitive awareness can be interpreted as a person's awareness of how to manage his cognitive processes for learning activities, remembering and doing a task. Metacognitive awareness includes the awareness of the abilities, strategies and resources needed to perform an assignment effectively, knowing what to do, and the ability to

use self-regulatory mechanisms to assure successful completion of a task, knowing how, when and what to do.

According to Aturupane et al (Abeygunawardena & Vithanapathirana, 2018) The main purpose of the Mathematics curriculum is to improve students' mathematical thinking and knowledge skills effectively in problem solving and decision-making. Furthermore, problem solving is a significant factor of mathematics education (Lessani, Yunus, & Bakar, 2017). Therefore, metacognitive becomes an important concept in mathematics education because metacognitive play a positive role on developing learners' thinking skills while problem solving.

Metacognitive is the awareness or understanding gained from one's knowledge (Sawhney & Bansal, 2015). Individuals with high metacognitive awareness are better at planning, managing information, monitoring, identifying errors, and evaluating compared to individuals with low metacognitive awareness (Tosun & Senosak, 2013). In addition, according to Baltas (Ozcan, 2014) learners who have metacognitive awareness allow to gain success and effectively control the cognitive processes during the learning process.

Based on the description, metacognitive awareness is not only required by learners at the school level only, but also required by students of mathematics education in higher education because basically they are students who have not fully become teachers. They are still experiencing the process of learning mathematics and the assumptions about mathematics still exist in their minds, so it can lead to metacognitive awareness of mathematics with different levels.

Therefore, this study examines the level of metacognitive awareness of mathematics education students based on the level of study period. The aspects analyzed in this study are knowledge about cognition and regulation of cognition. To determine the difference in metacognitive awareness level, the level of metacognitive awareness of students in the first year was compared with the level of metacognitive awareness of students in the second and third year. In addition, the factors that affect the level of metacognitive awareness of students based on the level of study period were also also analyzed.

2. Methodology

This research is quantitative descriptive through survey methods. According to Sawhney & Bansal (2015) this method has undoubtedly been the most popular and most widely used research method in education. The sample of the study was 31 subject per group from first,

second, and third-years at a state university in Indonesia. The groups are divided into three level according to first-years, second-years, and third-years college students in Department of Mathematics Education Singaperbangsa Karawang University, in Academic Year 2017-2018.

2.1 Research Instrument

To measure the levels of undergraduate students metacognitive awareness, the researcher used the Metacognition Awareness Inventory (MAI) developed by Schraw and Dennison (1994). The MAI consists of 52 items graded on a 5-point Likert scale ranging from 1 = *very unsuitable* to 5 = *very appropriate*. The inventory represents two-components, which are *knowledge about cognition* and *regulation about cognition*. The first component knowledge about cognition is classified into three sub-scales: *declarative knowledge*, *procedural knowledge*, and *conditional knowledge*. The second component regulation about cognition consists of five sub-scales: *planning*, *information management strategies*, *comprehension monitoring*, *debugging strategies* and *evaluation* (Gundogdu & Celebi, 2017).

2.2 Data Analysis

The data were analyzed as numbers, mean scores and percentages. The mean values of each sub-scales are calculated to determine the level of students' metacognitive awareness. After that, the average value obtained, grouped according to the criteria adapted from Feiz (2016) as in Table 1 below.

Table 1: *Categories of Mean Score* (adapted from Feiz, 2016)

Mean Ranges	Category
$3.75 \leq \bar{x} \leq 5$	Very High
$2.50 \leq \bar{x} < 3.75$	High
$1.25 \leq \bar{x} < 2.50$	Low
$0 \leq \bar{x} < 1.25$	Very Low

3. Results And Discussion

The level of metacognitive awareness of each student is determined by the average score on each scale and subscale. Thereafter, the average values that have been obtained are compared with the mean ranges in Table 1 and grouped by category. Based on the average distribution of knowledge about cognition, students in the second year had the highest average gain per subscale each category. For subscale declarative knowledge, 45% of students are in very high category.

Likewise in subscale procedural knowledge and conditional knowledge, 54% and 58% of students are in very high category. At this level of study, no student has low and very low metacognitive awareness.

The lowest average gain is in the third year level when compared to the others. In subscale declarative knowledge and conditional knowledge, only 38% and 41% of students are in very high category. In fact, in subscale procedural, only 8% of students are in very high category, the rest are only in high category. Although there are no students categorized in the low and very low range, the metacognitive awareness of third-year students which is at a very high level is low in comparison with the first and second year forces. The average data distribution on the scale of knowledge about cognition can be seen in Figure 1 below.

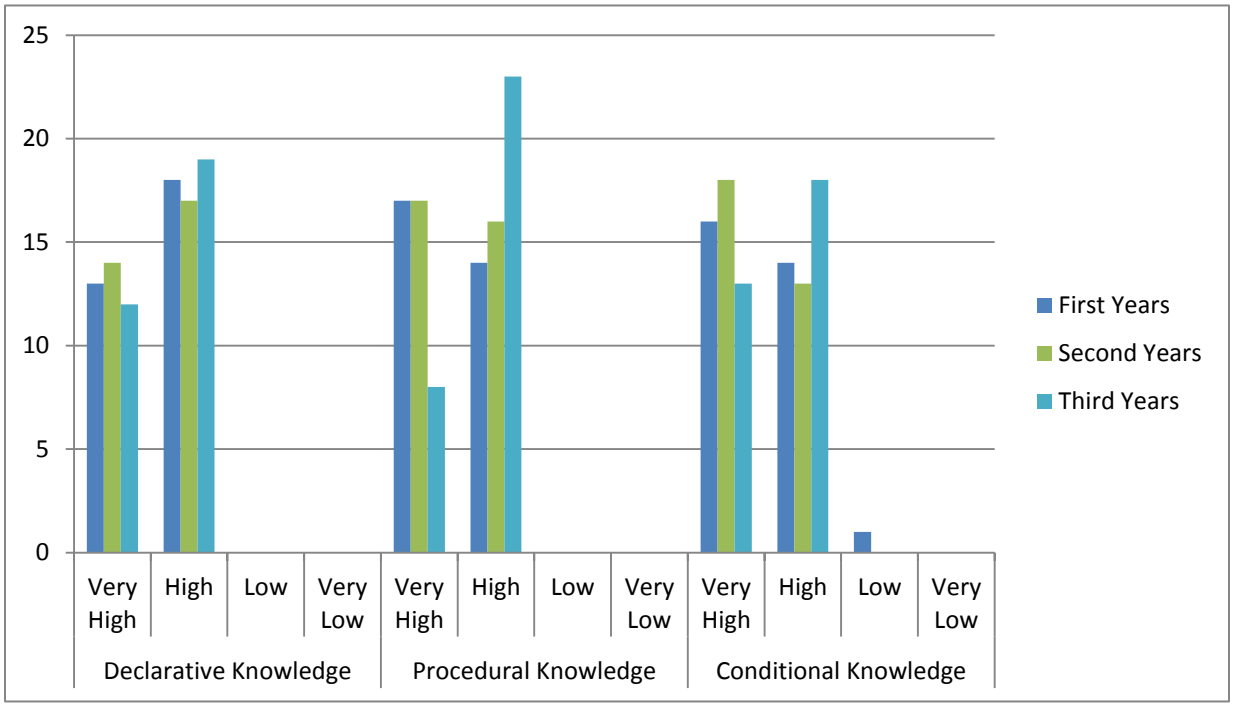

Figure 1: *Distribution of Subscale of Knowledge about Cognition*

The same condition also occurs in the subscale of regulation of cognition. The average distribution of third year students in very high category is smaller than the average distribution of first and second year students. Only on subscale of debugging strategies are slightly higher when compared with the others at 71%.

Decreased distribution is obviously seen in subscale information management strategies. In the very high category, the proportion of first year students is 51.6% while the proportion of second and third year students is only 32.3% and 25.8%. In addition, the average distribution in

the very high category of third year students in subscale planning and evaluation has a distribution of 41.9% whereas in subscale comprehension monitoring is only 16.1%. The average proportion of the subscale is very small when compared to the average proportion in the first and second years of the same category. The complete data of the average distribution of each category on the regulation of cognition can be seen in Figure 2 below.

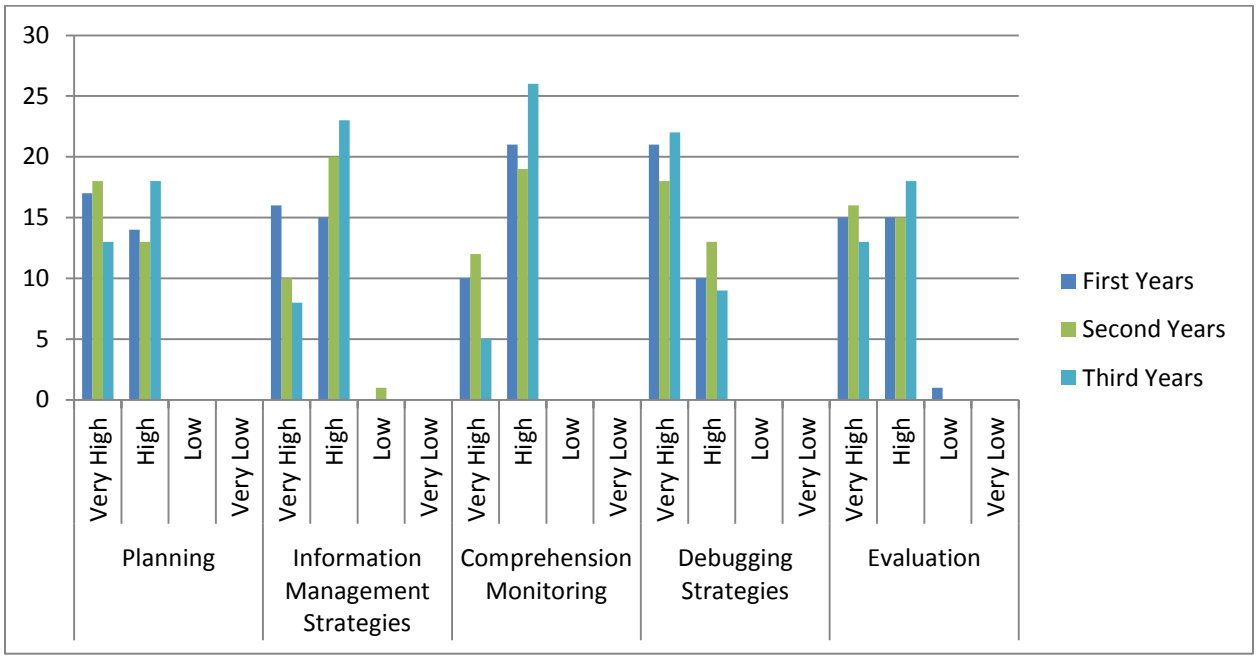

Figure 2: *Distribution of Subscale of Regulation of Cognition*

The findings of the present study indicated that the level of metacognitive awareness of the university students of mathematics at Singaperbangsa Karawang University in the third year has decreased in very high category in both knowledge and regulation of cognition compared with the level of metacognitive awareness in the first and second year. Although there are no students in the low and very low category, but the decrease of students in this very high category needs to be observed by the lecturers. Hsu & Hsieh (2014) examines three domains of factors affecting metacognitive, namely: (1) Demographic characteristic, including age, previous school attended, and months of work experience; (2) Learning involvement, covering time spent and frequency for study; and (3) Learning performances include attitude, self-evaluation, and satisfaction.

Third-graders have a lower average level of awareness than others because they have been burdened with a high number of semester credits (on average 20 credits per semester). The

number of semester credits that are taken also affect the learning involvement and their learning performances. If there's a task for every course, then more and more time will be spent by students to study the course per week. As a result, they have less time for studying each course because they have to divide their time by doing tasks of other subjects. In addition, the way students learn and how lecturers teach may also cause the decline in the average level of metacognitive awareness of students in addition to external factors and internal factors that still need to be studied further.

4. Conclusion

Based on the results and discussion above, it can be concluded that duration of the study did not affect the level of students' metacognitive awareness. this is in accordance with research conducted by Aljaberi & Gheith (2015) that the current year in the university had no effect on their level of metacognitive. From the results of this study also, there should be some efforts to increase students' metacognitive awareness. Furthermore, there is a need for further studying of factors affecting metacognitive awareness of mathematics education students of Singaperbangsa Karawang University based on class level.

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