Profile of Students' Metacognitive Skill Based on Their Learning Style

IOP Conf. Series: Journal of Physics: Conf. Series **1028** (2018) 012030 doi:10.1088/1742-6596/1028/1/012030

Profile of Students' Metacognitive Skill Based on Their Learning Style

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Abstract. The study was a descriptive research aimed to describe students' metacognitive skill based on their learning style. The study population was all first year students (n=150) in academic year 2016/2017 Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Indonesia. The sample were 82 students chosen through simple random sampling. The data was collected by using questionnaire adapted from MAI (Metacognitive Awareness Inventory) and SEMLI-S (Self Efficacy and Metacognition Learning Inventory-Science), and the learning style questionnaire. The research data were analyzed descriptively. The results of the study showed that (1) the learning style of biology students were visual, auditory, combination, and kinesthetic, (2) the metacognitive skills of biology students were well developed and (3) the metacognitive skills of biology students with visual, auditory, kinesthetic, and combinations were generally well developed. It was concluded that, biology students have the same metacognitive skill in all learning styles. The implications of these findings indicate that metacognitive skills of students need to be developed through learning process.

1. Introduction

Metacognitive skills play an important role in the cognitive activity of students, including understanding, communication, attention, memory, and problem solving [1]. It has been explained by Livingston[2] that metacognition has a very important role in successful learning. Learners who master the ability of metacognition has been found to be independent, honest, and dare to try. Thus, they tend to excel in learning [3,4]. The students' metacognitive skill and their learning style varies due to the different learning experiences obtained by each student through various different lectures. Previous researches have reported that biology students already have the metacognitive skills [5,6].

Metacognition is a term introduced by Flavell in 1976. Metacognition is defined as *the thinking about thinking* [2,7]. It is a knowledge about self or about the learning how to learn [8]. Metacognitive knowledge or knowledge about cognition consists of sub-components, namely (1) *declarative knowledge*, (2) *procedural knowledge*, and (3) *conditional knowledge* [9,10,11,12]. Other academics suggested another categorization of metacognitive knowledge which consists of three categories, namely: (1) *person variable* or knowledge of one's self, and thinking of others; (2) *task variable* or knowledge of the different types of tasks as cognitive demands, and (3) *strategy variable* or knowledge of cognitive and metacognitive strategies to improve learning and performance [13,14].

Learning style is an approach that describes how individuals learn. It is also a way used by each person to concentrate on the process of learning, so that the person can master a difficult and new

information through a different perception. The styles are individual for each person and can be used to distinguish the learners one another. Thus, it is generally assumed that learning style refers to the personalities, beliefs, choices, and behaviors that is used by the individual to assist their learning in a situation which has been conditioned [15]. Learning style can be known as a learning strategy or an approach to learning. Each style of learning, i.e. visual learning styles, auditory learning styles and kinesthetic learning styles has certain characteristics which can differentiate the learning styles one another [16].

Metacognitive skill is inter-related with one's learning style. It is reported that there is a significant relationship between the learning style dimensions and metacognition [17]. It is also reported that there is a significant relationship between learning style and the strategy of metacognition [18]. The interrelation between metacognition and students learning style is due to the potential of metacognitive skills to make students an independent learner. Each student has a different learning style, thus causing the distinction in learners' metacognition. However, learners have the tendency of a dominant learning style. It is reported that in general biology students has a tendency of the visual learning style [19]. It is also reported that almost half of the total number of learners have the visual learning style [20]. However, there has been no information about metacognitive skills of students in Department of Biology, Faculty of Mathematics and Natural Science, Universitas Negeri Makassar, based on the learning styles and its relation to the understanding of concepts. Metacognitive skills, conceptual understanding and learning styles are interrelated one another and has a potential to be the subject of further review. Thus, it is considered as necessary to assess students' metacognitive skills in Department of Biology based on their learning style.

2. Methods

This study is a descriptive research aimed to describe biology students' metacognitive skill based on their learning style. The research was conducted in academic year 2016/2017, Department of Biology, Faculty of Mathematics and Natural Science, Universitas Negeri Makassar, Indonesia. The population of this research were all first year students (n=150) registered in academic year 2016/2017 Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Indonesia. The research samples were 82 students chosen by simple random sampling.

Metacognitive skill data were collected by using MSI (Metacognitive Skill Inventory) questionnaire that was adapted from MAI (Metacognitive Awareness Inventory) [9] and SEMLI-S (Self Efficacy and Metacognition Learning Inventory-Science) [20]. Furthermore, the skills are grouped into four categories: not really improved, start to improve, properly improved, and improved well [22] Meanwhile, learning styles were collected by using a learning style questionnaire of Bobbi De Porter which has been modified by the researcher. Data were analyzed quantitatively by percentage

3. Results and Discussion

Table 1. Percentage of Biology Students' Learning Style

NO	Learning Style	Frequency	%
1	Visual	39	47.56
2	Auditory	19	23.17
3	Kinesthetic	10	12.20
4	Combination	14	17.07
	Total	82	100

Table 2. Metacognitive Skill Categories Based On Learning Styles.

No	Learning Style	Category of Metacognitive skill			
		NRI	STI	PI	IW
1	Visual	0.00	2.56	79.49	17.95
2	Auditory	0.00	0.00	73.68	26.32
3	Kinesthetic	0.00	0.00	60.00	40.00
4	Combination	0.00	0.00	78.57	21.43

Note:

NRI : Not Really Improved
STI : Start to Improved
PI : Properly Improved
IW : Improved Well

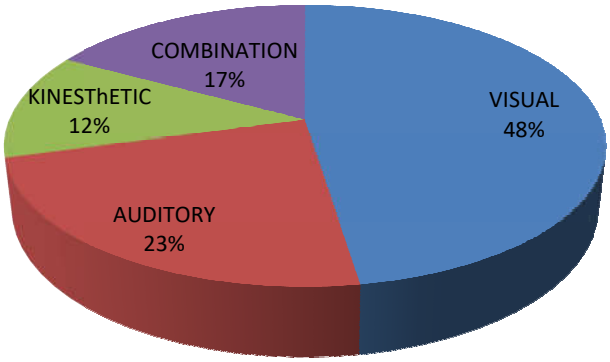

Figure 1. Percentage of Biology Students' Learning Style

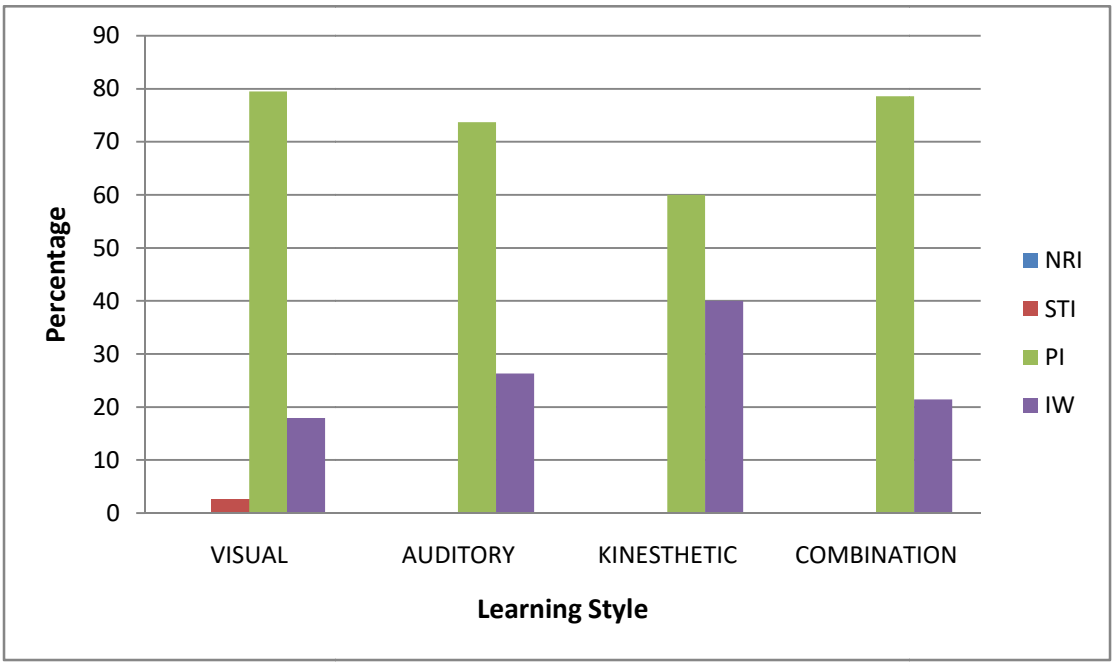

Figure 2. Metacognitive skill Categories Based on Learning Styles

The result of biology students learning style is presented in Table 1 and Fig. 1. The data in Table 1 shows that majority of biology students showed a tendency of having a dominant visual learning style, followed by auditory and combination learning style.

Table 2 and Fig. 2 show the categorization of students' metacognitive skill based on learning styles. The highest percentage of students' metacognitive skills in all types of learning are in "properly improved" category. Among the four types of learning style, the highest percentage of "properly improved" metacognitive skill category was found in visual learning style of 79.49%, followed by the combination learning style of 78.57%.

The highest percentage of "improved well" category of metacognitive skill was found in kinesthetic learning style. Meanwhile, metacognitive skill category of "not really improved" was not found in all types of learning style.

The data in this study showed that metacognitive skill of majority biology students are categorized as "properly improved" in all types of learning style. Metacognitive skill of "improved well" has also been found in all types of learning style. However, in visual learning type, there still students whose metacognitive skills categorized as "start to improved".

The highest percentage of "properly improved" metacognitive skills was found in visual learning style since it is the most dominant learning style of students in Biology Department. In addition, students with a visual learning style already has the ability to do lesson planning. The visual students learn best when starting with the whole image of the topic being learned. They will try to make an overview of the learning materials. When the students do this, it will help them to understand the learning materials. Thus, students with a visual learning style already has metacognitive skills which develop along with the growing level of their maturity in learning. It is in line with the finding of previous studies which found a significant relationship between learning style dimension and metacognition [17] and also a significant relationship between learning style and metacognitive strategies [18]

This study also found that there was no student whose metacognitive skill categorized as "not really improved" in all types of learning style. This means that any learning types posed by the students has shown the progression in the development of their metacognitive skills. The difference of learning style chosen by each individual reflects the fastest and the best way through which the individual understands information from the environment [23]. Thus, students have shown a better metacognitive skill. Students metacognitive skills need to be empowered since the beginning with attention to their learning style. Although, the research found that metacognitive skill in all styles of learning have varying frequencies.

In addition, the research findings also show that the highest percentage of metacognitive skill in "improved well" category was found in students with a tendency of kinesthetic learning style. Students with kinesthetic learning tendency can understand the concepts being learned with a better memory. The students have been accustomed to plan their learning activities which consists of setting the learning objectives, the learning sequences, the learning strategies, and the learning objectives [24]. The students undertake this planning for a better understanding on the concepts being learned. Thus, the students' metacognitive skills in all types of learning styles have been developing progressively. This suggests that the implemented learning process has empowered the students' metacognition. Therefore, the empowerment of metacognitive thinking skill during the learning process need to be taken into account to help students be familiar with metacognitive thinking.

4. Conclusion

In conclusion, the study found that majority of students in Biology Department have the same metacognitive skill in all learning styles. The implication of these findings indicate that metacognitive skills of students need to be developed through the learning process.

Acknowledgments
The research acknowledges the financial support from Non-Tax Revenue Funding of Mathematics and Natural Science Faculty, Universitas Negeri Makassar.

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