

**STUDENTS' METACOGNITIVE SKILLS FROM THE VIEWPOINT OF ANSWERING BIOLOGICAL QUESTIONS: IS IT ALREADY GOOD?****A. Fauzi\*<sup>1</sup> and W. Sa'diyah<sup>2</sup>**<sup>1</sup>Department of Biology Education, Universitas Muhammadiyah Malang, Indonesia<sup>2</sup>Tsukuba Life Science Inovation, School of Integrative and Global Majors, University of Tsukuba, Japan

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Accepted: April 28, 2019. Approved: September 28<sup>th</sup>, 2019. Published: September 30<sup>th</sup>, 2019**ABSTRACT**

Recent research in the science learning field emphasizes the importance of science learning that can empower 21st Century skills and implement metacognition-based learning. Metacognition is one of the foremost successful factors of learning achievement, which is the implementation in Indonesian schools is still being questioned. The present quantitative study aimed at gathering information on the profile of students' metacognitive skills in Malang and figuring out whether the students' grade influence metacognitive skills or not. This study was in ex post facto research which involves five levels of independent variables (grade level) and metacognitive skills as the dependent variable. The study involved 458 students (99 students in grade VII, 98 students in grade VIII, 98 students in grade IX, 77 students in grade X, and 86 students in grade XI) as the participants selected by homogeneous purposive sampling technique. The data of the metacognitive skills were collected by using Metacognitive Skills Rubric integrated with essay questions as the instrument. The collected data were analyzed through descriptive statistics and one-way ANOVA. The results of this study informed that the students' metacognitive skills in Malang at each grade were categorized in "very low". However, the level of grade significantly influenced the students' metacognitive skills. The Senior High School (SHS) students possessed the highest level of metacognitive skills, and the students of grade VII of Junior High School (JHS) were at the lowest level. Senior High School students have better metacognitive skills than JHS students due to this kind of skills could develop by the increase of students' grades in the process of education. The findings of this study also reveal the low level of students' metacognitive skills. Therefore, the learning process is recommended to implement various learning form that can empower students' metacognitive skills optimally.

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Keywords: metacognition, metacognition empowerment, metacognitive skills

**INTRODUCTION**

The teaching of science in the schools is expected to facilitate students to not only acquire the skills of 21st century but also encourage them to be an independent learner (Chalkiadaki, 2018) and long-life-learning person (Milić, 2013). In order to fulfill the expectations, the implementation

of teaching science in the schools has to increase the learning motivation of the students (Baldovino, 2018; Lord et al., 2010). The process of teaching and learning in the class should also enable the students to recognize their ways of learning (Sagitova, 2014). Also, the learning designs must be created to promote student to could regulate their learning process (Gonzalez-DeHass, 2016; Moos & Ringdal, 2012). Along with it all, science learning is expected to produce students who can

\*Correspondence Address

E-mail: ahmad\_fauzi@umm.ac.id

do the planning, monitoring, and evaluating their process of learning. That is why developing students' metacognitive skills are one of the crucial steps to achieve learning goals.

Metacognition is one of the processes of executive function, which is relevant to the process of learning (Gurbin, 2015). The students who have adequate metacognitive skills can monitor and control their thinking process (Patterson, 2011). The higher the level of the students' metacognition, the better their awareness of the learning process. Further, the students also possess good self-reflection (Metcalfe & Schwartz, 2018). They will quickly recognize which materials they have not known yet (Conley, 2014) and decide to stop, repeat, or continue their learning process (Miller, 2017). In short, the students will be able to effectively manage their ways of learning and know the appropriate time to learn.

If metacognition concept is taught effectively in the schools, the students will significantly improve their achievements. In other words, when the teachers integrate metacognition-based learning to their teaching, the students' learning outcomes are optimally enhanced (Perry et al., 2019). These statements are in line with the findings of previous studies which revealed that metacognitive skills had positive correlation with students' learning achievement (Mozafari et al., 2016). It does not only correlate with lower-order thinking skills achievement (Siswati & Corebima, 2017a) but also on critical thinking skills (Magno, 2010). Besides, metacognition also positively correlates with reasoning ability (Haryani et al., 2018) and implementing the knowledge effectively (Scharff et al., 2017).

One effective way to empower metacognition is when the teacher teaches various biological concepts to their students. Various studies also reported, by applying the appropriate learning design, biology learning was able to effectively empower student metacognition (Herlanti et al., 2017; Listiana et al., 2016). The good development of student metacognition will be seen from their ability to respond to the biological problems presented by the teacher. The statement is based on the references that inform a person's ability to communicate the results of their analysis or evaluation of a problem is one of the leading indicators in metacognitive skills (Corebima, 2009; Patterson, 2011).

The majority results of the studies about metacognition showed that metacognitive skills were different from metacognitive knowledge (Perry et al., 2019). That was why, several previous metacognitive studies were focusing on the

domain of metacognitive skills (Amin & Sukestiyarno, 2015; Colbert et al., 2015; Darmawan et al., 2018; Palennari et al., 2018). Some of the studies also reported that metacognitive skills had significantly influenced the learning outcomes (Siswati & Corebima, 2017b, 2017a), critical thinking skills (Diella & Ardiansyah, 2017), and other academic competences. Also, the metacognitive skills of the students could be seen from their communicative competences during interaction with others (Patterson, 2011). These previous findings that informed the various effects of metacognitive skills led the researchers to conduct studies about the development of metacognitive skills throughout the teaching process.

The implementation of metacognition-based learning model is the most effective way for the teachers to enhance the metacognitive skills. The learning models are, for instance, problem-based learning (Haryani et al., 2018), simaseric (Darmawan et al., 2018), search-solve-create-share (Corebima, 2017), project-based learning (Pavkov-Hrvojevic et al., 2016), and inquiry-based learning (Adnan & Bahri, 2018). Furthermore, some learning techniques such as reflection, self-assessment (Colbert et al., 2015; Pedone, 2014), feedback (Colbert et al., 2015), and mapping concept (Pedone, 2014) are also strongly recommended to develop students' metacognitive skills.

Unfortunately, most of the Indonesian teachers are rarely implement teaching designs which develop students' metacognitive skills. The statement is supported by the fact that reports the lack of Indonesian students' metacognitive skills (Diella & Ardiansyah, 2017; Nurajizah et al., 2018; Susilo et al., 2019; Tjalla & Putriyani, 2018; Yanti et al., 2017). This condition is indicated to occur in many regions in Indonesia, both in remote areas and in big cities.

The observations conducted in several schools in Malang in July 2018 also informed the same thing. The results of observations inform that many science teachers still often apply conventional learning. Some state schools in the Malang City area have indeed implemented some metacognition-based learning. PBL is the most often implemented by teachers at the school. However, most private schools in the Malang City area and most public and private schools in the Malang Regency area still apply learning that is less able to empower students' metacognition. Similar conditions were also seen in several schools in the Batu city area.

The condition is also increasingly reinforced from student worksheets that are not designed to empower student metacognition. There

are many worksheets with unclear learning syntax. Most schools have also involved practicum activities in the laboratory. Unfortunately, most of the practicums are not designed based on inquiry activities. The practicum handbook is designed like a "cookbook" where students only imitate the work procedures in the practicum, from determining the title of practicum, observation activities, data collection, to the format of tables in the reporting of practicum results.

Related to the observation results, the low awareness of teachers on developing metacognitive skills and their inadequate knowledge of metacognition has also been reported in the previous study (Dewi et al., 2017). The learning assessment which does not base on higher-level thinking (Winarti et al., 2015) and unsupported media and learning resources (Dewi et al., 2017) are also contributing to the problem. Interestingly, although the majority of studies informed the lack of metacognitive skills of the students, some other studies were on the contrary (Amin & Sukestiyarno, 2015; Palennari et al., 2018). Therefore, future studies on students' metacognition with different designs, perspectives, and instruments are highly recommended to be carried out to examine an in-depth analysis of metacognitive skills. Specifically, studies which aim at investigating metacognition of Junior and Senior High School students in Indonesia are still few in numbers.

Metacognition research has been carried out in Indonesia over the past few years. The most current research was studying the effect of applying learning models or strategies on the empowerment of students' metacognition, such as inquiry-based learning (Nunaki et al., 2019), project-based learning (Husamah, 2015), and problem-based learning (Haryani et al., 2018). Some other studies limit their research to the development of metacognition measurement instruments (Corebima, 2009; Zulfiani et al., 2018), while other studies aimed at developing metacognition-based learning source (Dewi et al., 2018) or media (Siagian et al., 2019). Other studies have indeed examined the metacognition profile of students, but only involved class XII high school students (Yanti et al., 2017) or involved first year undergraduate students only (Palennari et al., 2018). Both studies use the Metacognitive Awareness Inventory (or its adaptation) in measuring metacognition, a metacognition instrument that is indicated less able to describe the metacognition level of Indonesian students (Corebima, 2009). The questionnaire-based instrument was considered unable to describe the valid level of student metacognition.

Research that examines students' metacognition improvement from one class level to the class level needs to be conducted. This research will inform how the role of the learning process in schools in empowering students' metacognition. Such information will also be the basis for evaluating and reflecting the learning process in schools regarding metacognitive-based learning. Also, the research should use metacognition instruments that more suited to the characteristics of Indonesian students. Therefore, the purpose of this study was to examine the metacognition profiles of Junior High School/JHS (grades VII – IX) and Senior High School/SHS students (grade X and XI) using essay-based metacognitive skill instruments.

The current study presents the profile of students' metacognitive skills in Malang. It does not only investigate the profile of metacognitive skills of students in a particular grade but also students in some grades. It makes the study different from similar previous studies. Furthermore, this study employs different characteristics than other metacognitive studies. Firstly, the data on metacognitive skills are collected by using different instruments with previous studies. Secondly, this study involves greater participants than in other previous studies. Thirdly, this study also examines if the students' grades correlate to the level of students' metacognitive skills.

## METHODS

The present quantitative study includes ex post facto research design which aimed at presenting the profile of students' metacognitive skills in Malang. The study was limited in the metacognitive profile of the Junior High School (grades VII – IX) and Senior High School students (grade X and XI) in Malang. The steps of the study were developing the instruments, piloting and trying out the question items, selecting the participants, analyzing the data, and interpreting the findings. The collection of the data was carried out by conducting test using the developed instrument in the targeted schools that were randomly selected. The administration of the test involved the students of Department of Biology Education, the University of Muhammadiyah Malang who were joining the teaching apprentice program in their schools.

The study population was all high school students in Malang, while the sample was 458 students selected through homogenous purposive sampling. The homogenous sample creates based on school academic level. The selected schools

were categorized as moderate school, those schools are classified neither high academic nor low academic level (the names of these schools are not mentioned in detail in this study for ethical reasons). In detail, they were 99 students in grade VII, 98 students in grade VIII, 98 students in grade IX, 77 students in grade X, and 86 students in grade XI. They were selected randomly from nine Junior High Schools and nine Senior High Schools around Malang municipality.

The data of metacognitive skills were obtained from the scores of students' responses to the essay questions. There were ten-question items with cognitive level minimum C4 that should be answered by the students. The validity and reliability of the question items were ensured by Pearson Correlation and Cronbach Alpha analysis. In detail, the topics asked on each item, and result of the validation test could be seen in Table 1. The student's responses were scored based on the Rubric of Metacognitive Skills developed by Corebima (2009). The rubric was a Likert model with the scale 0 – 7 and had some criteria: the construction of sentences, the systematics of responses, the grammatical patterns, the explanation of responses, and the accuracy of responses. The data in the form of students' responses, then, were calculated into metacognitive skills data by using formula (1). In formula (1),  $y_2$  is combined score of metacognitive skills and mastery of concepts;  $y_1$  is students' concept mastery score; and  $x$  is students' metacognitive skills score.

$$y_2 = \frac{y_1 + 2x}{3} \dots\dots\dots (1)$$

**Table 1.** List of Topics and Validity Test Results of Test Items

Items	Topics
1	The role of biology in aspects of human life
2	Biological relations with other branches of science
3	Application of scientific attitude
4	Cells
5	Relations between levels of organization of life
6	The role of viruses in human life
7	Components of the ecosystem
8	Difference between Fungi and green plants
9	The theory of evolution
10	The role of nutrition for human life

The scores of students' responses were analyzed by using descriptive and analytical statistics. Firstly, the students' average scores in every grade were calculated. The level of students' metacognitive skills was based on categories presented in Table 2. Afterward, the data of students' competencies were analyzed by employing one-way analysis of variance (ANOVA) to reveal if there was a different level of competences in the different grades. The Least Significant Difference (LSD) was chosen as the additional analysis after ANOVA. The result of LSD analysis was presented in the chart.

**Table 2.** The Categories of Metacognition Level

Scores	Categories
86-100	Very good
76-85	Good
60-75	Enough
55-59	Low
0-54	Very low

## RESULTS AND DISCUSSION

Metacognitive skills play a crucial role in supporting students' learning achievement. The present study analyzed the metacognitive skills of the students in grade VII to XI in Malang. The data of metacognitive skills were presented in Table 3. Based on Table 3, it was shown that the average skills of critical thinking of the students in all grades were categorized as "very bad". The findings implied that the development of students' metacognitive skills in Malang was not maximum.

**Table 3.** Metacognitive Skills Mean Scores of Junior and Senior High School Students in Malang

Grades	Mean ± SD	Category
VII	10.61 ± 5.866	Very low
VIII	13.09 ± 7.341	Very low
IX	15.53 ± 6.483	Very low
X	19.42 ± 7.288	Very low
XI	17.58 ± 6.768	Very low

The low level of metacognitive skills of the students in Malang revealed in this study. It was consistent with the information about metacognitive level of the students in other regions as described by the previous studies such as in Sukabumi (Nurajizah et al., 2018), Tasikmalaya (Diella & Ardiansyah, 2017), Bandar Lampung

(Yanti et al., 2017), Papua (Tjalla & Putriyani, 2018), Medan (Diella & Ardiansyah, 2017), and Semarang (Susilo et al., 2019). The information was based on the actual studies and the profile of students' competence in which the researchers, according to the ethics of research, were on the neutral side. In other words, the information obtained from the present study or other previous studies were the real condition of the students in the schools.

The students' unfamiliarity with the model of question items as the instrument in this study might have interfered the findings. It was due to the measurement of students' metacognitive skills used in this study was based on their abilities in expressing the idea after analyzing and evaluating the information presented in the test. The students who have high level of metacognitive skills would give grammatically appropriate responses and well-structured sentences (Corebima, 2009). Then, the problem was if the students were barely trained to evaluate and analyze their problems, they would encounter the difficulty in giving the proper responses in the test. Some results of previous studies supported this information in which Indonesian students were rarely, even never, exposed with high order thinking questions (Kusaeri et al., 2019). Therefore, they had some problems in providing responses to the questions (Hadi et al., 2018).

Another internal factor that contributed to the lack of students' metacognitive skills was their communicative competences. As explained in the beginning, the ability to respond to the questions by using well-structured and understandable language was one of the indicators of one's metacognitive skills. This statement was supported by Patterson's (2011) explanation stated that a person who had adequate metacognitive skills would be able to communicate with others in the real context of communication and assured their utterances were clearly understood. Excellent communication ability was monitoring the utterances a person said and wrote and evaluating the understanding of interlocutors about what being communicated. However, this study revealed that the communicative competences of Indonesian students, both spoken and written, was categorized as "low" (Wangsa et al., 2017), even some of them did not convey a clear and understandable meaning when communicating (Musliah et al., 2015). As a result, it was not surprising when this study showed the low level of students' metacognitive skills.

The concern and insufficient knowledge of teachers about metacognition also became an obstacle in developing students' metacognitive skills (Rahman et al., 2010). One of the indicators was the implementation of teaching and learning activities that was only teacher-centered – the teacher was delivering concepts and materials to the students. It was emphasized by the fact that in many Indonesian schools, the teachers were rarely implementing student-centered teaching – the learning activities were dominated by students while the teachers as to be the facilitator (Kurniati & Surya, 2017; Zulfikar, 2013). The application of conventional model of teaching inhibited the development of students' metacognitive skills during the learning process (Alzahrani, 2017). Moreover, the condition was worsened with the limited availability of learning resources and assessment that had not designed based on higher critical thinking skills (Dewi et al., 2017; Ramdiah et al., 2019).

The observation results that conducted before, during, and after the process of taking quantitative data in this study also reveal the reason why students' metacognitive skills level in Malang still in the low category. Observations that have been conducted in several schools were generally showed that a small number of schools have implemented metacognition-based learning. Most of the remaining schools had not yet implemented such learning.

Some schools that have implemented metacognition-based learning are more concentrated in the Malang City area. These schools are dominated by public schools where PBL is the most common learning model implemented by teachers in these schools. A worksheet from one of the state schools was able to show the PBL learning syntax that students must follow clearly. On the other hand, other public schools and most private schools in the Malang City area have not yet implemented such learning. Discussion activities do appear in some learning, but the learning flow is less able to reflect one of the learning models that could empower metacognition.

In line with several schools in Malang City, many schools in Malang Regency also still implement learning that was less able to empower students' metacognition. Some teachers more often instruct students to answer questions on student worksheets then class discussions take place. Practicum activities were also carried out using practical manuals that guide each step

of students, from the beginning of the practicum to how to report the results of the practicum. As a result, the inquiry process was not well realized in the practicum activities.

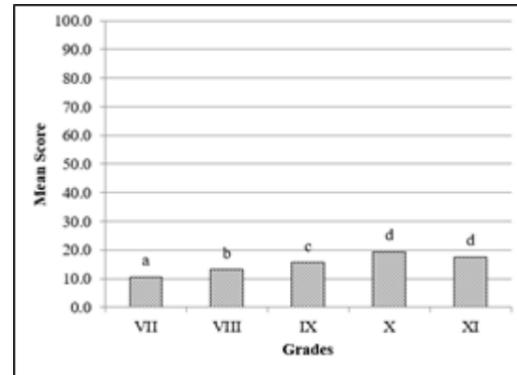
The activities of the internship teachers distributed in many schools in the Malang City and Batu City also inform the same thing. Yet, almost all internship teachers do not understand what metacognition is and how to empower it. The accompanying teacher was also not able to guide the internship teachers to design and implement various learning models that could improve students' metacognition.

Furthermore, based on the Kolmogorov-Smirnov test, the data of this study were normally distributed (p-value grades VII, VIII, IX, X, and XI were .052; .091; .200; .052; and .200). The result of Levene's test also informed that the variance among groups were homogeneity (p-value = .056). Therefore, the data of the present study fulfilled the requirements to be analyzed by using one-way ANOVA. The summary of the ANOVA test was presented in Table 4. The result of ANOVA analysis described that the students' grade had significantly influenced the students' metacognitive skills in Malang [ $F(4;453) = 23.984, p < .005; \eta^2 = .175$ ]. There was a significant difference in metacognitive skills average; that was why LSD was utilized to carry out further analysis. The result of LSD analysis was presented in Figure 1.

**Table 4.** The Summary of ANOVA Test Results on the Effect of Grade Level on Metacognitive Skills

Sources	df	F	Sig.	Partial Eta Squared
Contrast	4	23.984	<.005	.175
Error	453			

It could be seen in figure 1, the students in grade VII significantly possessed the lowest metacognitive skills than the other grades. The students in grade VIII acquired higher level of metacognitive ability than students in grade VII. Then, the average of metacognitive skills performed by the students in grade IX was remarkably higher than the students in the lower grades. Furthermore, the average of metacognitive skills of the students in Senior High Schools was also better than the students of Junior High Schools. In conclusion, the finding of this study indicated that the higher the grades of the students, the better their levels of metacognitive skills.



**Figure 1.** The Summary of LSD Test Results. Differences Notation Represents the Mean Difference at the Significance Level 0.05

The improvement of students' metacognitive skills from a lower grade to the higher grade described that this kind of skills could develop by the increase of students' grades in the process of education. The result of this study was in consistent with the previous studies reported that the level of education was an important factor in contributing to the quality of students' critical thinking (Siswati & Corebima, 2017c). The finding was also supported by Coşkun (2018) who conducted a study on the contribution of students grades to their metacognitive abilities. The metacognitive skills developed when the aspect of cognitive was regularly used. A person who pursued higher education would receive and respond to various information by using their cognitive abilities. Hence, the longer a person involved in educational process, the frequent he used their cognitive process. In other words, students would be more competent in term of metacognitive ability when their grades increased. To sum up, it was undeniable that the higher the students' grades, the better their levels of metacognitive skills.

Although the average of students' metacognitive skills improved, based on Table 3, their knowledge of metacognition was still categorized in "very low". It implied that even though the metacognitive skills had been improved during the teaching and learning process, it had not been optimal yet. In addition, the metacognitive skills of students in grade X and XII were not significantly different which is indicated that the learning process in grade XII was not effective to enhance the students' metacognitive level. In terms of developing students' metacognition, the findings of this Indonesian study were quite different with what have been found by some studies carried out by the researchers in other countries. They reported that the development of students' metacogni-

on had successfully conducted, such as in Turkey (Coşkun, 2018) and India (Gopinath, 2014). Nevertheless, the lack of students metacognitive skills was not only happened in Indonesia since there was a study showing students metacognitive profile that had a similar result with this study (Jaleel & Premachandran, 2016).

In responding to the result of this present study on students' metacognitive skills, the researcher suggests that the quality of educational system and implementation of teaching and learning process in Indonesia must be improved. The improvement is aimed at maximizing the development of students' metacognitive skills. The most crucial and essential step is improving teachers' skill to design and implement metacognition-based teaching in their classroom, as they play a crucial role in teaching process. Some of the learning models that can be carried out by the teachers, for instance, are problem-based learning (Haryani et al., 2018; Panchu et al., 2016), project-based learning (Sumampouw et al., 2016), and simaseric (Darmawan et al., 2018). Also, some other references suggest a more active model of teaching such as inquiry learning (Adnan & Bahri, 2018; Thomas, 2012), self-reflection activities (Colbert et al., 2015), and mind-mapping (Pedone, 2014).

Besides the enormous numbers of the recommended teaching models, strategies, and techniques, some principles that should be considered by the teachers in order to optimize the students' metacognitive skills. Firstly, the teachers have to believe that their students can change their cognitive function. Secondly, the teachers must be able to encourage students to be aware of the importance of materials that were being discussed. Besides, the teachers should be an expert of designing a set of assessment that is not only measuring the lower-order thinking skills but also developing students metacognition skills such as portfolio (Gencel, 2017) and self-assessment (Siegesmund, 2017). In this context, giving a lot of exposures to the students to evaluate their learning should be conducted in order to build the students' awareness and self-efficacy (Miller, 2017). As a result, the students are motivated to decide what have they do to understand the materials that were being discussed. Finally, the teachers have to make their students regularly involve in the continuing metacognition-based learning.

Designing good quality of metacognitive learning is not a piece of cake, particularly for teachers who do not acquire the concept and are not familiar with metacognition. Consequently, professional development programs and teach-

er training are highly needed in order to create well-trained teachers so that they are ready to develop the metacognitive skills of their students. One of the teacher professionalism programs that are considered effective and has significant impacts to the quality of students' metacognitive development is Lesson study. Lesson study is a teacher professionalism development program which facilitates teachers to improve their teaching quality through collaborative activities (Isozaki, 2013; Watanabe, 2018). The collaborative activities consist of planning, evaluating, and reflecting the teaching and learning process together. As a result, teachers and the team are optimizing the function of learning to develop students' metacognitive skills. Besides, studies about the improvement of metacognitive skills and meta-analyses studies on metacognition are suggested to be carried out in Indonesia. This kind of studies is needed to gain trend and description of the current results (Cavas, 2015; Eǧmir et al., 2017; Fauzi & Pradipta, 2018). Through the activities, hopefully, the teaching models that have positive impacts on the students' metacognition could be identified and collected. Furthermore, information obtained from meta-analyses studies can be used as a guideline for the future researchers to conduct other studies.

In the 21<sup>st</sup>-century education, students are required to access their understanding accurately (Miller, 2017). In this context, the role of teachers is to be an excellent facilitator for the students so that they can implement their learning strategies and be successful learners (Chauhan & Singh, 2014). In order to achieve the goal, metacognition must be the learning priority to improve the students awareness toward the teaching and learning process (Alzahrani, 2017). That is why, in the recent decades, metacognition is considered an essential variable in pursuing positive learning achievement (Millis, 2016).

Metacognition is closely related to other factors which are used to predict the students' achievement. Metacognition is also significantly correlated with students motivation (Oguz & Ataseven, 2016) which is not only general motivation but also self-efficacy and students achievement goals (Muna et al., 2017). Students who have good metacognitive skills will be more confident during the process of learning (Kisac & Budak, 2014). It will improve their learning achievements. Thus, it is undeniable that metacognition is very important and crucial in the process of teaching and learning, so that it is always put as the main subject in the education studies (Peteranetz, 2016). In a nutshell, the recommendation based

on the findings of this study about metacognitive skills should be taken into account to improve the quality of education in Indonesia.

However, this study has several limitations that need to be addressed in future studies. The choice of schools from moderate levels is one of the limitations of the study. The selection of high- and low-level academic schools seems to need to be done to see students' metacognitive skills generally. In addition, the involvement of different academic level schools can be used to study the effect of academic levels on metacognitive skills. The collecting data process using only one type of instrument is also another limitation of this study. Therefore, the assessment of student metacognition profiles using various other instruments is highly recommended. Some other instruments, e.g. the Metacognitive Awareness Inventory (Schraw & Dennison, 1994) or Metacognitive Strategy Knowledge Test (Karlen, 2017) were recommended for use. The use of Teacher Metacognition Inventory (Jiang et al., 2016), Teachers' Metacognition Scale (Wilson & Bai, 2010), or Awareness of Independent Learning Inventory (Meijer et al., 2013) also needs to be done to see the information about metacognition profile of teachers and Pre-service teachers, considering that teaching factors probably cause one of the causes of the low level of students' metacognition.

## CONCLUSION

To sum up, the present study presented the profile of students' metacognitive skills in Malang. The findings showed that the metacognitive skills of the students in all grades (VII – XI) were categorized as "very low". Furthermore, the JHS students in grade VII performed the lowest level of metacognitive skills than other grades, while the students in grades X and XI possessed the highest level of metacognitive skills. The results of this study have revealed an unfortunate learning condition. The education process in secondary schools is less able to empower students' metacognitive skills. Information from this research can also be used as a basis for related education service policies and as a primary reference for teachers and education researchers, especially in the Malang region.

Since the findings revealed that the students were lack of metacognitive skills, the development of students' metacognition should be a crucial issue in the education field and research in Indonesia. The potential solution to solve this problem is that teachers are encouraged to im-

prove their knowledge and understanding of metacognition and trained to design well-structured metacognition-based learning. By this, it is expected that they can be a good and professional facilitator to their students in order to develop metacognitive skills. Then, the availability of learning resources and metacognition-based assessment should be also taken into account. In addition, content analysis of metacognition studies in Indonesia has to be conducted in order to see the progress of metacognitive development and to find the best solution to solve the problem.

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