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Metacognitive Thinking Ability and Mastery of Biology Concepts of Students in Regional Schools Coffee Plantations with Collaborative Learning

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ABSTRACT

Indonesia is one of the largest coffee producing countries in the world which is ranked 4th after Brazil, Colombia, and Vietnam. One of the coffee producing areas in Indonesia is Jember Regency, East Java. However, unfortunately education in plantation areas is said to have a low quality of education where existing facilities, facilities and infrastructure are less supportive and generally still apply teacher-focused learning or conventional learning which causes learning outcomes to be suboptimal. Therefore, teachers are expected to create learning activities that can increase student activity. One of them is collaborative learning. The purpose of this study was to determine the influence of the application of collaborative learning sharing levels and jumping tasks on metacognitive thinking skills and mastery of biology concepts of students in coffee plantation area schools. Research methods using quasi-experiments, by determining the experimental class and control class. The research design used is pretest-posttest control group design. The application of collaborative learning level sharing and jumping tasks involves students in an active learning process, so as to improve students' metacognitive thinking skills and mastery of biological concepts. The results of research conducted at MA Al- Hidayah showed that collaborative learning sharing levels and jumping tasks can improve metacognitive thinking skills and mastery of biological concepts. The results of the ANCOVA test analysis of students' metacognitive thinking ability and mastery of biology concepts showed a significance value of 0.000 or < 0.05 H0 rejected Ha was accepted. So it can be interpreted that the application of collaborative learning sharing levels and jumping tasks has a significant effect on students' metacognitive thinking ability and understanding of biology concepts.

Keywords: [Education, Collaborative Learning]

INTRODUCTION

Indonesia is one of the largest coffee producing countries in the world which is ranked 4th after Brazil, Colombia, and Vietnam. One of the coffee producing areas in Indonesia is Jember Regency, East Java which has an area of 16,882 ha of coffee plantations, of which 5,601.31 ha are community coffee plantations (Rahmadianto et al., 2019). Jember Regency has 2 coffee production areas, namely in the slopes of Mount Raung and the slopes of Mount Argopuro. Raung Slope includes Silo, Mayang, Pakusari, Kalisat, Sumberjambe, and Ledokombo districts. While the Agropuro Slope includes Sumberbaru, Tanggul, Bangsalsari, Rambipuji, Panti, Sukorambi, Arjasa, and Jelbuk Districts (Wakhid & Suciati, 2020). It shows that most of the human resources in the plantation area are still low and do not have a background in the plantation sector. Therefore, it is necessary to increase human resources so that coffee productivity in Jember can continue to be optimized. Sinaga (2013)

One way to improve existing human resources (HR) is through education. According to Vito (2018) quality human resources will have an impact on optimizing the natural resources around and supporting the economy for the better. Syahrani (2019) stated that the quality of Indonesian education is still far behind compared to other countries. The results of research conducted by the Central Statistics Agency show that development achievements from the global education dimension still show lagging, which is ranked 116th out of 189 countries. This is due to the input, process and output components that are still not handled and completed completely. Education in plantation areas itself is said to have a low quality of education where existing facilities, facilities and infrastructure are less supportive and generally still apply teacher-focused learning or conventional learning which causes learning outcomes to be not optimal (Pratiwi et al., 2016). The characteristics of students at a coffee plantation school in Jember indicate that students are less active or tend to be passive in solving a complex or complex problem. students are not interested in proving a concept, conducting investigations and making generalizations and are not interested in solving non-routine problems (Suratno & Kurniati, 2017). Conditions like this cause interest in learning, student independence and thinking patterns including metacognitive thinking knowledge and ability and mastery of concepts to be underdeveloped.

Metacognitive knowledge plays an important role in creating quality education in Indonesia which can be applied in the 2013 Curriculum, because it is in accordance with its purpose, namely so that students are better at observing, asking, reasoning, and being able to voice their opinions after students have obtained learning materials. Therefore, it is very important if the learner as well as the educator has metacognitive knowledge in him (Indraini et al., 2013). Students with high metacognitive will contribute high in improving their mastery of concepts, therefore the ability to think metacognitively is important in improving students' mastery of concepts, especially in biology lessons. One of the benefits of empowering metacognitive thinking skills is to shape students into self-regulated learners, namely someone who will be responsible for the progress of self-learning and be able to determine whether the learning activities that have been carried out are successful or not (Dewi et al., 2016).

The importance of metacognitive thinking ability is based on several definitions of metacognition. Some experts have put forward several definitions of metacognition, namely: (1) control of cognition and cognitive processes, (2) the process of recognizing and reviewing how cognitive processes or learning processes themselves (3) metacognition refers to learning people's thinking ability to understand and monitor the learning process, (4) knowledge of one's own learning process, how he learns and how he reviews his learning style. The purpose of development and also the improvement of metacognitive thinking ability for the student to be able to know and understand how he performs his tasks (Aisyah & Ridlo, 2015: 24).

Metacognitive thinking abilities that are not continuously developed and empowered can affect mastery of concepts and of course affect student learning outcomes. The ability to think metacognitively has a positive relationship with learning outcomes, where students who have high metacognitive thinking ability then their cognitive learning outcomes are also high. According to Hermanto (2021) the metacognitive thinking ability possessed by students can develop mastery of concepts because students can construct knowledge, then apply it and deepen existing concepts, so that it will give rise to scientific answers that show an understanding.

Mastery is the ability to explain and also describe things in more detail, while concepts are the result of thoughts or ideas.

Mastery of concepts is an ability to understand and also master a material where the individual can reintroduce or re-explain concepts that have been understood not only those that are known and also able to apply them (Munasiah, 2021).

Concepts are the basis for determining a principle, therefore concepts are knowledge that must be possessed by every student. The concept itself is an idea obtained from the results of thinking. This is in accordance with Dahar's opinion which states that a concept is something that is obtained and produced from the process of thinking and can be accepted by the mind. In other words, a concept is an idea or the result of the thoughts of a person or group of people that is stated in the definition so as to give birth to a product of knowledge including, principles, laws and theories. The existing concept does not mean that it is always fixed, but it can also change with the times where facts and knowledge are increasingly developed and always updated, while the function of the concept is to provide explanations. From the already mentioned understanding, it can be said that concepts are knowledge resulting from a flexible thinking process that can change following the most recent changes in knowledge so that the knowledge possessed will not be consumed in the modern era as it is today.

Collaborative learning is a learning activity that encourages students to play an active role in the learning process by providing a problem that must be solved in small groups (Diana, 2020). One of the collaborative learning methods is sharing levels and jumping tasks. Sharing Level is a group task in which there are several children who have different levels of ability which aims to facilitate slow children to learn assisted by other friends. So that it can build metacognitive thinking skills. Jumping tasks help students improve & develop higher-order thinking skills (Saskiyah & Putri, 2019) and it is hoped that students will be able to independently actively multiply the knowledge they have (Hobri & Susanto, 2016).

Collaborative learning is learning that is based on Vygotsky's theory of social constructivism. The theory of social constructivism is also known as the Zone of Proximal Development (ZPD). Vygotsky's ZPD theory centers on the achievements of llmu done by providing scaffolding**.** Scaffolding given to students is not done by the teacher, but can also be done by peers who have higher academic abilities, for example in completing a task that is done together through discussion. Meanwhile, teachers can provide scaffolding in the form of questions, directions, and instructions to guide students in understanding a concept. Wiersema (2000) states that collaborative learning is a philosophy: working together, building together, learning together, changing together, improving together.

MATERIALS & METHODS

The type of research used is quasi experiment or pseudo-experiment. The research design used is pretest-posttest control group design. The application of collaborative learning sharing levels and jumping tasks in experimental classes and the application of conventional learning includes discussion and question and answer in control classes. The research site was carried out at MA Al-Hidayah Silo, Jember Regency. The research place was determined by the purposive sampling area method, namely by deliberately determining the research area with the population of this study, namely all students of class XI MIPA in the even semester of the 2021/2022 academic year. For samples, it is necessary to conduct preliminary tests, namely normality and homogeneity tests and obtain samples of class XI MIPA 1 as an experimental class and XI MIPA 2 as a control class.

Analysis of students' metacognitive thinking ability was measured using the Metacognitive Awareness inventory (MAI) questionnaire. MAI is an instrument adapted by Cooper & Urena (2009) that is used to encourage knowledge and metacognitive thinking ability of students. MAI

questionnaires will be tested during pre-test and post-test (Hapsari, 2016). The inventory used in the study was 4 alternatives, namely strongly disagree (STS) with a score of 1. Disagree (TS) with a score of 2, Agree (S) with a score of 3 and strongly agree (ST) with a score of 4. Scores will be converted into a scale of 0-100 and categorized based on the MAI Value criteria as follows.

Score achievement = (number of scores)/ (maximum score) ×100

Table 1 MAI Result Value Criteria

Category	Criteria
0-20	Still very risky
21-40	Not so developed yet
41-60	Start Growing
61-80	Well Developed
81-100	Very Well Developed

Analysis of students' mastery of concepts is by obtaining pre-test and post-test scores with indicators of remembering (C1), understanding (C2), applying (C3), analyzing (C4), studying (C5), and creating (C6) (Alpusari et al., 2015). The value of each question will be calculated in the manner as
next

The value of each question = (score obtained by students)/(maximum score of question items) ×100
The data obtained from the pre-test and post-test results will later be analyzed with the ANCOVA TEST.

RESULT

Normality Test Results - The first SPSS test is a prerequisite test including a normality test and a homogeneity test to determine the sample to be used in the study. The normality test uses the Kolmogrov-Smirnov One-Sample which is used to determine the normal distributed class. Normality test results show that XI IPA 1 and XI IPA 2 have a significance of > 0.05 which means that the data is distributed normally.
Homogeneity Test - The next stage is that the homogeneity test is used to find out whether the existing data is homogeneous or not. The homogeneity test used One-Way Anova and the test results showed a significance of > 0.05 which can be seen in table 4.2. This means that class XI IPA 1 and XI IPA 2 have the same or homogeneous variants. So the prerequisite tests that have been carried out show that the class is normal and homogeneous. Then it can be determined class XI IPA 1 as the experimental class and class XI IPA 2 as the control class.
The MAI questionnaire data obtained will then be continued with prerequisite tests, namely normality tests and homogeneity tests that show a significance of >0.05. The data has met the prerequisite test, so it can be continued with the ANCOVA test. The results of the analysis of the ANCOVA test for metacognitive thinking ability can be seen in the table below

Table 2 Analysis Results of the ANCOVA Test of Metacognitive Thinking Ability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7829.636[a]	1	7829,636	443,157	,000	,890
Intercept	489969,987	1	489969,987	27732,285	,000	,998
Kelas	7829,636	1	7829,636	443,157	,000	,890
Error	971,732	55	17,668			
Total	513582,000	57				
Corrected Total	8801,368	56				

The results of the ANCOVA test of metacognitive thinking ability in the table showed a significance value of 0.000 or < 0.05 H0 rejected Ha was accepted. So it can be interpreted that the application of Collaborative Learning Sharing Level and Jumping Task has a significant effect on students' metacognitive thinking ability.

Students' mastery of biology concepts is measured by the pre-test and post-test scores that have been carried out in both control classes and experimental classes. Pre-test is used to measure students' initial concept mastery and post-test to measure students' mastery of final concepts Pre-test and post-test scores are presented in the table below

Table 3 Pre-Test and Post-Test Scores Control Class and Experimental Class

	Number of students	Average ± Elementary School Initial Concept Mastery	Average ± Elementary School Mastery of the Final Concept	Average Difference
Kontrol	31	42,50 ± 10,63	52,58 ± 11,11	10,08
Eksperimen	26	54,97 ± 7,70	74,45 ± 6,83	19,48

The pre-test and post-test values obtained will then be continued with prerequisite tests, namely normality tests and homogeneity tests with significance results of >0.05. The data has met the prerequisite test, so it can be continued with the ANCOVA test. The results of the ANCOVA test analysis of mastery of biological concepts can be seen in the table below

Tabel 4 Table 4. 7 ANCOVA Test Mastery of Biological Concepts

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	8329.455[a]	1	8329,455	97,958	,000	,640
Intercept	232097,877	1	232097,877	2729,580	,000	,980
Kelas	8329,455	1	8329,455	97,958	,000	,640
Error	4676,685	55	85,031			
Total	254742,000	57				
Corrected Total	13006,140	56				

The results of the ANCOVA test on the concept mastery in the table showed a significance value of 0.000 or < 0.05 H0 rejected Ha was accepted. So it can be interpreted that the application of collaborative learning sharing levels and jumping tasks has a significant effect on students' mastery of biology concepts.

DISCUSSION

Collaborative learning sharing levels and jumping tasks have 5 stages, namely engagement, exploration, transformation presentation and reflection. Metacognitive itself has two components, namely metacognitive knowledge and metacognitive skills. Metacognitive knowledge relates to the student himself with his tasks and learning strategies that include 1) declarative knowledge, 2) procedural knowledge, and 3) conditional knowledge. The next component is metacognitive skills related to planning, monitoring, and evaluation including 1) planning, 2) information management strategies, 3) comprehensive monitoring, 4) debugging strategies and 5) evaluation (Murni, 2010).

The eight indicators can be used to show that all eight indicators in both the control class and the experiment class have improved. Although both have improved in each indicator, the experimental class has a greater difference. This shows that the application of collaborative learning sharing levels and jumping tasks in experimental classes is more significantly influential, learning dominated by student activity will improve their metacognitive thinking ability compared to students who are passive in the learning process. This is in line with Kamaliyah's research, et al (2022) which states that metacognitive thinking ability can be formed by a learning process that is constructive in nature and emphasizes the interaction and communication of knowledge formation from active student activities, one of which is collaborative learning. Sefrida., et al (2018) stated that the exchange of information during discussions will train students to think critically and broaden their horizons where students will learn from each other together, exchange thoughts and compare them with the thoughts of other friends, students with less ability will ask students who are more capable and vice versa students with more abilities will explain to other friends.

The results of the analysis with the ANCOVA test of mastery of biological concepts showed a significance value of 0.000 or < 0.05 this means that the

application of collaborative learning sharing levels and jumping tasks has a significant effect on students' mastery of biology concepts. This is in line with Siri's research (2020) where collaborative learning that involves student activity not only helps in understanding difficult learning materials but also encourages students to think critically, help each other and work together between friends to solve a problem that will later be concluded together. The first stage is engagement, at this stage the teacher will create small groups with 4-5 students per group, where each group consists of students who have high, medium and low abilities. This is so that there is an exchange of information between students, and students can receive opinions from each other. In the second stage, the teacher will give a problem-related assignment and students will try to find answers to problems from several existing sources. The next stage is transformation, at this stage each student is obliged to voice his opinion from reading various sources that have been done at the exploration stage to his groupmates. The fourth stage, namely the presentation of the results of discussions that have been carried out by each group, will be presented in front of other groups. The purpose of the presentation is to find out students' understanding of the given problem. The last stage is reflection, at this stage students carry out a question and answer process with groups that do not make presentations. The presentation group will receive answers, responses or objections from other groups and try to answer

The positive impact of active student participation in the learning process will also be followed by increased student achievement. by including students to play an active role and interact directly with the learning resources used so that students can practice to improve their metacognitive abilities (Febriani et al., 2015). Therefore, the application of collaborative learning, one of which is sharing levels and jumping tasks, is believed to improve student mastery because this learning focuses on students and there is a dominant interaction between students and students.

The difference in the improvement of metacognitive thinking ability is far away and the low average score of mastery of concepts in the control class is due to students being passive in the learning process. This is in line with the research of Tendrita et al., (2017) where learning activities are always related to student activity including listening, writing, discussing, solving and solving a problem. With a learning process that is followed directly and actively participates, students will better understand a concept. Another study conducted by Marhamah et al., (2017) stated that the collaborative learning stages that have been applied, especially sharing levels and jumping tasks, have been proven to increase student learning activities. This is because in every collaborative learning process from beginning to end always encourages students to play an active role and be directly involved, for example in discussion groups.

The collaborative learning method of sharing levels and jumping tasks applied is also influenced by other factors, one of which is gender. In collaborative learning activities, of course, it is related to activities that are carried out together, and at the time of research it can be seen that the activities of working together are more running in the female class, this can be caused because male students are more willing to dominate and a high sense of competition between each other, so female students are more oriented towards a relationship that is realized between each other. Andriani *et al.*, (2018) in Papalia et al., (2008) which states that men tend to have higher self-esteem and want to always highlight themselves among their peers and are also more individual, while women have high self-esteem by highlighting themselves in collaborative activities, not competitive, therefore female students are more successful in collaborating or collaborating

CONCLUSION

The results of ANCOVA test analysis on students' metacognitive thinking ability and mastery of biology concepts showed a significance value of 0.000 or < 0.05. So it can be interpreted that the application of collaborative learning sharing levels and jumping tasks has a significant effect on students' metacognitive thinking ability and understanding of biology concepts. This is because in every collaborative learning process sharing levels and jumping tasks from beginning to end always encourage students to play an active role and be directly involved, for example in discussion groups. This research is expected to be used as one of the solutions in facing problems in the world of education to create a better education in Indonesia.

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