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## student reading interest and metacognitiv awareness

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# Students' Reading Interest and Metacognitive Awareness in the Reading Concept Map (Remap) Model Integrated to Cooperative Learning in Biology

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**Abstract.** The aims of this research were to determine the effect of learning model that can improve students' reading interest and metacognitive awareness. This research employed quasi-experimental design which purpose is to increase students' reading interest and metacognitive awareness through the use of Remap learning model which is integrated to several cooperative learning (Reading-Concept Mapping-Cooperative Learning) including Cooperative Integrated Reading and Composition (CIRC), Group Investigation (GI), Teams Games Tournaments (TGT). The sample for this research was selected randomly students from two high schools in Malang city, Indonesia. The was survey form utilized to get data of reading interest and metacognitive awareness. The data were then analyzed using an Ancova. The results showed that Remap- CIRC was the most advantageous learning model in improving reading interest compared to other learning models. While for the metacognitive awareness, the future research needs to consider other more accurate and precise instruments for measuring the metacognitive awareness.

**Keywords:** Reading Interest, Mapping Concepts, Metacognitive Awareness, Cooperative Learning, Remap Coople

## 1 Introduction

Indonesians students' lack of reading awareness is mostly caused by students' low order of thinking which influences the students' learning outcome or achievement. Zubaidah et al. [1] stated that reading activities play a strategic role in the learning process to facilitate students' thinking skill because most knowledge is in the form of written documents, and this fact requires students to read to gain knowledge.

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Prior knowledge is needed in the learning process especially in Biology learning since it is important for conceptual understanding in the learning of Biology [1]. [2] also said that the written text understanding and higher order of thinking skill are pivotal to improve students' academic achievement, specifically when it is about the abstract concept in Biology which makes students must understand, interpret concept, and

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2 build a coherent scientific understanding. This can be done by letting the students differentiate facts and opinions, understanding meaning, finding a correlation of certain incident or event, understanding details, looking at several points of views, and applying what they have learned from the process happening in real life situation [3].

2 The result of a study conducted by [4] showed that most Indonesian students' reading skill is still very low. This finding is similar to what has been found from the observation done to tenth grade MIA 2 students in State High School 9 Malang in September of 2014. The study found that students' reading interest is rated as low with only 3.7% students who have reading as a hobby, while 85% students prefer to spend their free time by playing gadget than reading, and only 7.4% students who prepare the upcoming lesson by reading the learning material at home. Therefore, making reading as students' habit requires full awareness from the students themselves. One of the ways to build students' awareness of reading is through metacognitive activities.

4 The new trend in the domain of understanding written text has been emphasized in the aspect of metacognitive awareness from the cognitive process and one's motivation during the reading process [5]. Actually, readers have a metacognitive skill which the readers are usually unaware. This metacognitive skill plays an important role in the process of understanding the written text. Moreover, metacognition is also linked to the students' ability to automatically control and evaluate their learning.

29 This argument is in line to the research result done by [6] which implied that reading activity is closely related to metacognition which is connected to the metacognitive awareness of the reading strategy and is related to the perceiving of strategy, the use of strategy, and the reading understanding. In metacognitive, there is metacognition which helps students to set their learning strategy (reading the lesson material).

17 Metacognitive awareness is developed from only in the form of knowledge and knowledge setting which then become strategy and skill that encourage students to solve problems and employ a higher order of thinking [7]. Based on its development, metacognitive awareness is defined as a form of students' awareness to think about how to learn independently through evaluating and controlling their own learning process.

28 15 Metacognitive awareness is a metacognition leading to a higher order of thinking which involves active control of cognitive process during the learning. So, this makes students possible to pay more attention to what they do, why, and how their learned skill can be utilized in different situations [8]. Metacognitive awareness is a need in students' thinking process which is done starting from the beginning of the learning process [9]. Reading is linked to metacognitive awareness (what is known) and regulation or metacognitive control (knowing when, where, and how to use the strategy).

The result from observation and interview on 22-29 September of 2014 showed that the students of tenth grade MIA 2 from State High School 9 Malang had low metacognitive awareness. The fact of students' low reading interest and low metacognitive awareness also happened to the students of tenth grade MIA 2 from State High School 9 Malang and students of tenth grade MIA 2 from State High School 7 Malang.

Biology lesson requires students to read the references first in order to improve their knowledge and to help them understand the concept further. Reading is important for students since they will need it to relate real-world content to their career later. This is a must because before one can apply the real world concept, one must fully know and

understand what one has learned since this understanding will mostly be transferred to the new related situation [10].

Metacognitive awareness must be encouraged and developed in the learning process starting from the beginning of the semester. Supportive classroom atmosphere can not be achieved fully using only traditional or conventional learning process. Thus, stimulus to activate and improve the metacognitive awareness is crucial, and this can be done by applying active and innovative learning which can help students to be familiar to reading, creating and building the important concept from reading, doing activities together, and evaluating all learning activities. All of them can be actualized in many ways, and one of the ways is by applying to learn through reading, mind mapping, and cooperative learning (Remap-Coople).

According to the facts explained before, it is important to apply a Biology learning using Reading Concept Map Cooperative Learning (Remap Coople) based learning model. It is expected that this learning model can improve students reading interest and metacognitive awareness. This learning model consists of the process of reading combined with concept mapping and cooperative learning. This model requires students to read as the initial stage of learning before they do the in-class learning during the application of cooperative learning. Then, the students create concept mapping as prove of their reading activity. [11] stated that the concept mapping is a media that can be used to represent knowledge illustrated from the concept and explicit things which later forms a meaningful hierarchical structure.

One of the concepts making implication is cooperative learning from Remap. Cooperative learning can be done through grouping which will make students easier to interact [12]. Learning from remap, reading, and concept mapping is done outside the in-class hours and does not infiltrate the instruction of learning activities done in the classroom [13]. Hence, an in-class learning model that can support the remap activities is needed for creating more structured learning activities.

Remap learning model requires students to read as the initial stage of learning process before they experience learning in the classroom, and during the in-class learning students are exposed to cooperative learning, then they will be asked to create concept mapping at the end of the lesson. The selected cooperative learning is Cooperative Integrated Reading and Composition (CIRC), Group Investigation (GI), and Teams Games Tournaments (TGT).

CIRC is a learning model which makes students do a reading activity, mastering the topic of a text, and think to find the main idea of the text, and retell as well as respond to the context discussed in the text. [14] said that in CIRC, students learn directly on how to use the strategies which support the metacognitive understanding and strategies.

GI learning model is based on the philosophy of constructivism which demands students to build their own knowledge where the teacher plays a role as facilitator. During the face to face GI learning process, students plan their own assignments on what to learn, do an investigation, collect information, and give feedback to each other, so students can employ self-regulated learning [15] TGT is a unique cooperative learning through academic games. In TGT learning, students play Games and Tournaments every week after finishing the teamwork. Through TGT, the in-class learning process



is expected to be fun so students will not get bored while the learning process providing a new learning experience to the students.

Activities in the learning process of Remap CIRC, Remap GI and Remap TGT can build students' reading interest and metacognitive awareness which will affect students' cognitive learning outcome. In reading stage, students must read the material before coming to the class. Reading activities can improve students' knowledge while increasing their reading interest and empowering their metacognitive awareness as they do planning and monitoring of their learning material. The application of STAD, Remap TGT, Remap GI, CIRC cooperative learning can develop students' reading interest and metacognition skill.

**Problem of Research.** Based on the explanation above, this research was done to identify the comparison of tenth grade high school students' reading interest and metacognitive awareness in Malang in the application of Biology learning using Reading Concept Map Cooperative Integrated Reading and Composition (Remap CIRC), Reading Concept Map Group Investigation (Remap GI), and Reading Concept Map Teams Games Tournaments (Remap TGT) based learning.

## 2 Method

This research is a quasi-experimental study done in the odd semester of September-December 2014. The dependent variables were students' reading interest and metacognitive awareness while the independent variable was Remap learning integrated to the cooperative learning including Cooperative Integrated Reading and Composition (CIRC), Group Investigation (GI) and Teams Games Tournament (TGT). The experimental class in this research employed Remap CIRC, Remap GI, and Remap TGT, while the control class applied conventional learning involving activities of lecturing, presentation, and discussion.

### 2.1 Sample of Research

The population in this research was all tenth-grade students from MIA State High School Malang, Indonesia. The sample was 108 students from tenth grade which are from four different schools. Further, the population involved 25 classes and the sample selection was done based on the linearity test which results in 108 students from ten different classes. Then, the experimental and control class were determined randomly.

### 2.2 Instrument and Procedures

The instrument for this research was survey form which was used to collect data of reading interest, inventory form of metacognitive awareness, a form of learning syntax implementation for Remap CIRC, Remap GI, and Remap TGT. This research was applied in the lesson of Virus, Archaeobacteria and Eubacteria, and Protista in Biology subject. The completion of learning syntax form was assisted by three observers. The

data then were resulted in the form of reading interest, metacognitive awareness, and the record of the learning process.

## 2.3 Data Analysis

The data of reading interest and metacognitive awareness were analyzed using Analysis of Covariance (Ancova) with significance 0.05 ( $P < 0.05$ ). Before the Ancova was processed, normality test using One-Sample Kolmogorov-Smirnov and homogeneity test using Levene's Test of Equality of Error Variances were conducted.

## 3 Result and Discussion

### 3.1 Results

The hypothesis testing using Ancova was done after the homogeneity test and normality test which resulted in  $p > 0.05$ . This indicated that the data were homogenous and normal. The result of Ancova analysis implied that there was the impact of Remap CIRC, Remap GI, and Remap TGT based learning to students' reading interest. The summary of reading interest using Ancova is displayed in Table 1. According to data in Table 1, the score was  $F = 7.510$  with significance  $< 0.001$  which is lower than 0.05. This indicated that Remap CIRC, Remap GI, and Remap TGT based Biology learning affected students' reading interest.

**Table 1.** Summary of Ancova Analysis of Reading Interest

Source	Type III Sum of Squares	Degree of Freedom	Mean Square	F	Sig.
Corrected Model	2679.507(a)	4	669.877	9.865	<0.001
Intercept	2301.786	1	2301.786	33.898	<0.001
XReading	1273.439	1	1273.439	18.754	<0.001
Class	1529.788	3	509.929	7.510	<0.001
Error	6994.063	103	67.904		
Total	670152.334	108			
Corrected Total	9673.570	107			

The result of a further study in Table 2 showed that Remap CIRC, Remap GI and Remap TGT based Biology learning model had significant effect to the students' reading interest which made the result was completely different from the control group. Remap CIRC learning model had the most significant effect on students' reading interest compared to Remap GI and Remap TGT model and this is displayed from the score of 82.90 of students' reading interest change. This huge effect is different from what can be seen as the result of Remap GI, but this is not completely different from the result of Remap TGT. The Remap TGT based Biology learning model affected the students' reading interest as can be seen that the increasing score achieving 80.49 which is only slightly different from the result of Remap GI. Remap GI based learning model

had the lowest effect for increasing students' reading interest when compared to Remap CIRC and Remap TGT indicated by the corrected reading interest score of 76.23.

**Table 2.** The result of Further Study of Students' Reading Interest in Various Learning Models

Model	Pretest Scores	Posttest Scores	Difference	Corrected Scores	Notation LSD
Control	73.40	72.92	-0.48	72.93	a
Remap GI	73.88	76.44	2.57	76.23	b
Remap TGT	75.54	81.45	5.91	80.49	b c
Remap CIRC	70.33	81.50	11.17	82.90	c

The result of covariant analysis (Ancova) also implied that there was the effect of Remap CIRC, Remap GI, and Remap TGT based Biology learning model to the students' metacognitive awareness as can be seen in Table 3. The data show that the F score is 11.852 with significance <0.001, lower than 0.05 which means that Remap CIRC, Remap GI, and Remap TGT based Biology learning model affected students' metacognitive awareness.

**Table 3.** Summary of Anacova Analysis of Metacognitive Awareness Data

Source	Type III Sum of Squares	Degree of Freedom	Mean Square	F	Sig.
Corrected Model	5183.030(a)	4	1295.757	14.366	<0.001
Intercept	2705.809	1	2705.809	29.999	<0.001
XSMETA	3000.170	1	3000.170	33.262	<0.001
CLASS	3207.024	3	1069.008	11.852	<0.001
Error	9290.395	103	90.198		
Total	596008.456	108			
Corrected Total	14473.424	107			

The data analysis results as shown in Table 4 imply that Remap CIRC based Biology learning model gave the most significant impact to students' metacognitive awareness compared to Remap GI and Remap TGT which is shown with the corrected score 82.27. This Remap CIRC score result is the opposite of the Remap GI, Remap TGT, and control class result. The corrected result of Remap GI based Biology learning model effect for the students' metacognitive awareness is 75.21, and this is in contrast to the result of Remap TGT, and control class result. Meanwhile, Remap TGT based Biology learning model had the least effect to the students' metacognitive awareness when compared to the Remap CIR and Remap GI model which was represented by the metacognitive awareness corrected score of 69.50, and this result is just slightly different from the result of the control class.

**Table 4.** The Result of Further Study of the Difference of Students' Metacognitive Awareness in Various Learning Model

Model	Pretest Scores	Posttest Scores	Difference	Corrected Scores	Notation LSD
Control	68.96	67.09	-1.88	67.63	a
Remap TGT	74.68	72.03	-2.64	69.50	a
Remap GI	69.85	75.15	5.30	75.21	b
Remap CIRC	65.29	79.75	14.46	82.27	c

### 3.2 Discussion

**The Difference of Students' Reading Interest in the Remap CIRC, Remap GI and Remap TGT Biology Based Learning Model.** In this research, Remap CIRC Biology based learning model had the most significant effect on students' reading interest compared to Remap GI and Remap TGT model because, in Remap CIRC, students did reading activities before the class activities and during the class activities in the Remap CIRC learning model. [16] stated that one of the objectives of CIRC program is to heighten students' opportunity to read aloud and receive feedback from their reading activity by instructing the students to read for their teammates and by training them to know how to respond to each other's reading activity.

Reading activity during the Remap CIRC can help students to develop the lesson they learn. This learning model can also add more reading sources and enrich students' knowledge related to the concept of the lesson, as well as empower the students' reading interest since in the reading text, there are plenty of new information the students can get which is related to the lesson but are not available in students' Biology hand book. From reading, students can also learn to find the main idea of the text together with their friends. [17] found that the CIRC model creates a livelier learning environment and makes the students have more interest to read.

Remap GI based Biology learning model was the least affected learning model for students' reading interest compared to Remap TGT because the GI learning model syntax leans more to facilitate students' thinking skill although students are also required to collect information from various sources which can help in facilitating students' reading interest during the investigation process. Another factor affecting students' lack of reading interest during the implementation of the Remap GI model is because students are interested more in reading non-Biology themed texts. Moreover, students often did not have enough time to read at home because of the abundant school assignments they had to finish or it can be caused by students' packed activities for school clubs. [18] stated that most students do not have enough time for reading or the books are not attractive for them, and those can happen because students are already overwhelmed by the school assignments.

In this research, the effect given by Remap TGT learning model was supported by its learning syntax. During the reading, students read the material related to the lesson that accommodated their reading interest while during the games and tournaments, the fun activities motivated students to read more about the lesson in order to win the games and tournaments done in the classroom.

This research result is supported by the result of a study done by [19] which showed that the Remap TGT based Biology learning model can improve students' reading interest. During the implementation of Remap TGT learning, students are encouraged to have more knowledge than their friends who become their opponent in answering questions during games and tournaments. So from games and tournaments, students will be more motivated to increase their amount of reading which of course imply to the improvement of reading interest.

**The Advantage of Remap in Improving Reading Interest and Metacognitive Awareness.** Reading stage in Remap learning facilitates students' reading activity so by doing more reading, students can understand and memorize new information related to the lesson they learn. As stated [20] during the reading process there is self-regulation in understanding the text. Reading interest must be developed since it will affect students' thinking skill which will give impact to students' cognitive learning result. [21][22] found that reading interest had a positive effect in developing students' thinking skill.

Reading interest affects students' academic achievement because it supports students to widen their knowledge and helps students achieve the learning objectives. The higher the reading interest, the better the learning achievement the students get, and vice versa. [23]described that reading interest helps students to have a good academic performance every time. Further, students also get the meaning and knowledge they need for learning. Results from studies conducted by [24] unveiled that reading interest has significant role and impact to students' successful learning. [25] added that reading interest encourages students to improve their knowledge.

Remap learning model ends with the mapping concept constructed by students individually. Mapping concept building utilizes students' metacognition as not only students must learn to find the theoretical concept and find a relationship between concepts, students also fix the incorrect conceptual understanding which finally results in meaningful hierarchical concept. As mentioned [16], concept mapping is a tool or way that can be used to organize and identify the students' knowledge. Students' knowledge and concept changes which have been learned before based on the concept of connections can be identified through concept mapping. Concepts' visualization assists students to reflect on their writing and helps them develop their metacognitive skills [26], [27].

Metacognition is important for students to possess as this affects their learning success. This argument is supported by [28] who argued that metacognition plays a crucial role in the success of learning. The advantage of metacognition (strategy) for teacher and students is that it can emphasize self-monitoring and responsibility (self-monitoring is one of a higher order of thinking forms). [29] explained further that there is a relationship between metacognitive awareness and students' learning result.

When students know which part of the lesson they have understood and which part they have not understood, it means students use their metacognitive awareness which supports their meaningful learning. [30] stated that in concept mapping learning, students develop the connection between various concepts from the lesson. [31] also found that concept mapping can help students organize hardly understood the concept to

become the meaningful structure which is advantageous in identifying the difficult concept, in constructing and understanding the lesson, and in improving memory retention.

**The Strength of CIRC, GI, and TGT in Building Students' Metacognitive Awareness.** Activities of reading texts following CIRC help students to find problems and then note the information in the form of main ideas, so the information can facilitate students' metacognitive awareness. CIRC learning activities also train students' metacognitive awareness through feedback session about the main ideas of the text and through problem solving session. This can happen because students need to think about various main and alternative ideas and discuss those ideas with their teammates to achieve the most effective solution. It means students set their understanding strategies and evaluate their progress in finishing the assignments. Both of them are the core basis of metacognition. Students will have control over their learning process as they identify the lessons they have known and have not known yet, so they will use their metacognitive skill.

[30] explained that students in the CIRC learning model receive direct teaching for the lesson in the form of strategies that can support lesson understanding and metacognitive strategies. This integrated learning specifically develops different learning materials from the materials used in another related learning basis. The research [32] showed that the learning using CIRC can improve students' metacognitive awareness.

CIRC learning model directs the students to read texts aloud and then take notes of the main ideas in the text. From this process, students can understand the lesson better because there are many aspects involved during the reading aloud activity. The activity of rewriting the main ideas or underlining the topics of the text facilitates students to recall the text outlines. These learning activities motivate students to improve their reading interest and metacognitive awareness.

1 The implementation of Remap GI based Biology learning model in this research has shown that Remap GI affected students' metacognitive awareness and it is also useful in facilitating students' thinking skill. This effect is there because Remap GI activities make students actively involved during the learning including during assignments planning, investigating, planning the final report, final report presentation, and evaluating their learning covering related topics, the finished assignments, and about how efficient the cognitive strategies they implement during the learning process. Those activities are parts of metacognition, so it can be concluded that Remap GI can facilitate students' metacognitive awareness.

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2 GI learning model emphasizes students' active participation in deciding the topic, investigating problems, analyzing findings, and presenting the research results. This model can improve students' activities and participation to find their own learning materials (information) with the help of various learning sources such as related books and internet-based sources [33], [34].

2 As stated by [35] learning using GI can increase students' metacognitive awareness and skill. GI learning model will create an active learning environment because it trains students to build learning strategy plan, investigate, collect information, report the investigation result, evaluate, and give feedback to the learned topics. Students will

develop their cognitive skill to plan their learning process and to try making improvement from their reflection results at every end of the lesson.

Remap TGT learning model in this research has affected the students' metacognitive awareness although the effect is the least significant when compared to the Remap CIRC and Remap GI. The effect of Remap TGT is supported by the syntax of Remap TGT learning which can facilitate students' metacognitive awareness.

Game and Tournament in the Remap TGT can create a fun learning environment for students, so they are more motivated to learn. Students will be more interested to prepare for learning and make the planning of their learning activities comprising strategies and time that they will use for learning. Moreover, students will also learn to control their learning process. Then, in the Tournament session, students evaluate themselves by giving feedback on the related lesson material, so they can improve their thinking process and learning strategies. The whole process of planning, monitoring, and evaluating done by students during the learning process are parts of metacognition, so it is clear that Remap TGT can facilitate students' metacognition and metacognitive awareness

**A score of Students' Metacognitive Awareness in Traditional Learning and Remap TGT Learning which Experiences Decline from Pretest to Posttest is Suspected to be Caused by the Use of Inventory/Survey.** The covariant analysis result of the corrected metacognitive awareness score for students who are taught using Remap TGT and conventional learning are 69.50 and 67.63 respectively. These facts show that students' metacognitive awareness when taught using Remap TGT model is 1.87 higher than in control class which is taught by using conventional model, and it implies that the difference from both results is not significantly different.

The metacognitive scoring using inventory of metacognitive awareness in the form of MAI rubric is used to measure cognitive knowledge (measure the awareness of one's strengths and weaknesses, knowledge of strategies and their use), and to measure cognitive setting (measure the knowledge of planning, monitoring and evaluating).

Facts happened during the completion of MAI rubric showed that students experienced difficulties to understand each question in MAI rubric. This fact is supported by Zubaidah, et al. [1] who explained that students do not want to spend much time in reading and understanding each question item, so they tend to answer the questions by choosing the options which they think is best without full consideration. This poor way of completing the rubric makes this instrument cannot fully display the students' real metacognitive awareness.

One of the factors that are suspected to be the cause of the problem is the difficulty in measuring students' metacognitive awareness, which makes it takes a long time to measure students' metacognitive awareness, and another cause is students' poor way of completing the MAI rubric. [36] stated that the difficulty in measuring students' metacognitive awareness is caused by two reasons. First, the lack of generally accepted concept about metacognition and the second is because metacognition is an internal process and awareness, not a clear behavior, so the consequence is that people often do not realize those internal processes happen to themselves. MAI rubric used in this research is expected to be able for measuring students' metacognitive awareness.



4

The results from this study are in line with the result found by [37] that students' metacognitive awareness experienced a decline from pretest to posttest. Also found that there is no improvement of students' metacognitive awareness through the implementation of Remap TGT based Biology learning model. This probably happens because students are not answering the questions in the MAI instrument based on the complete truth of their condition. Thus, they cannot clearly show their real metacognitive awareness from their answer.

19

From that study employed in Elementary School, Junior High School, and Senior High School in Mataram, Malang, Blitar, and Palangkaraya, it is found that 7.1-85% students experienced a declining score at the end of the study. This instrument is incompatible to measure Indonesian students' metacognitive awareness and skill because most students are indifferent in answering the instrument's items so their answer is not trusted to unveil their real metacognitive awareness and skill. Therefore, another instrument to measure students' metacognitive awareness and skill is needed.

10

12

**Traditional Learning that is Less Effective to Improve Students' Reading Interest and Metacognitive Awareness.** Traditional learning that was employed in the control class resulted in a decline of students' reading interest and metacognitive awareness. This is because of the learning which is more teacher- centered. Teacher mostly gave lectures during the learning process which made students less active and only listened to what was said by the teacher. The learning strategies facilitated by the teacher did not require students to do activities that could build and develop their reading interest and metacognitive awareness. Previous studies were done by showed that learning strategies affect students' metacognitive awareness and skill [13].

## 4 Conclusion

3

Based on the research result, it can be concluded that there is a difference of High School students' reading interest and metacognitive awareness in Malang through the implementation of Remap CIRC, Remap GI, and Remap TGT leaning model. It is suggested that Remap CIRC learning model is applied in the classroom because this learning model has the most significant effect to students' reading interest and metacognitive awareness compared to Remap GI and Remap TGT learning model. Further research about students' reading interest and metacognitive awareness should be conducted in a longer period in improving students' reading interest and metacognitive awareness.

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