



The Effects of Reading and Concept Map Teams Games Tournament Model Assisted by Picture Card and Snake Ladder on Students' Critical Thinking Skills

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Abstract

This study aims to determine the significant effect of the application of the reading and map concept learning models teams games tournament with the help of picture cards and snake ladders on students' critical thinking skills on the material excretion system. This type of research is quasi experimental with a nonequivalent control group design using purposive sampling in class VIII D and class VIII E from the population in class VIII A to class VIII H. The research data were obtained from pretest and posttest scores and questionnaire sheets. The results of the t-test analysis related to critical thinking skills showed -0.13 in the initial data and 10.47 in the final data. Analysis of N-gain on increasing students' critical thinking skills results 0.80 (high) for the experimental class and 0.38 (moderate) for the control class. The results of the questionnaire sheet analysis showed a percentage of 89.30% with a very good category. Based on this it was concluded that learning using the reading and map concept team games tournament model with the help of picture cards and snake ladder on the excretion system material affects the improvement of students' critical thinking skills.

How to Cite

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INTRODUCTION

The role of education in the 21st century is becoming increasingly important in preparing the next nation who has the skills to think, use technology and information media (Mayasari *et al.*, 2016). In addition to these skills, in the 21st century there are several abilities that must be mastered including: (1) critical thinking and problem solving skills, (2) collaboration and leadership, (3) agility and adaptability, (4) initiative and entrepreneurial spirit, (5) able to communicate effectively both orally and in writing, (6) able to access and analyze information, and (7) have curiosity and imagination (Zubaidah, 2016).

One of them is critical thinking skills, which is a student's attitude to think and reflect on problems that involve cognitive, analytical, rational, and logical processes (Ningsih *et al.*, 2012). This critical thinking skill is appropriate if applied in a lesson because it can make students have the ability and strategy to solve a problem appropriately (Saheri *et al.*, 2017).

Permendikbud No. 22 of 2016 also emphasizes that the learning process in educational units can be held interactively, inspiring, fun, challenging, motivating students to be active and think critically. This application is supported by the 2013 curriculum which recommends applying aspects of critical thinking skills to learning so that students do not only focus on mastering the material but other understandings such as problem solving (Saheri *et al.*, 2017). Science learning is not only learning about a collection of knowledge in the form of facts, concepts, or principles but also a process of discovery in the form of the media used or the model used (Zubaidah, 2016).

Based on the results of an interview with a science teacher at SMP Negeri 18 Semarang, whose address is Jl. Purwoyoso 1, Purwoyoso, Kec. Ngaliyan, Semarang City, Central Java 50184, has constraints in the form of the selection of models and learning media used when delivering material, one of these materials is the human excretion system. The teacher in delivering the material only uses the lecture method supported by the pictures in the manual. The learning process receives responses from students through interviews, where students expect a pleasant learning process, make students active, and generate interest in learning from students so that the classroom atmosphere is conducive and comfortable in the learning process. This resulted in low grade VIII student learning outcomes. The low results can be seen in the results of the Final Semester Assessment in the odd semester science subject.

Based on these results, a treatment is needed that can improve student learning outcomes. The TGT Remap learning model (Reading & concept map - Teams Games Tournament) is a solution in learning supported by the research of Pangestuti *et al.* (2014) where the remap teams games tournament can increase reading interest, critical thinking skills, awareness and metacognitive skills, as well as student science learning outcomes. This learning model is preceded by a Remap in the form of reading and a concept map before learning and this helps in improving students' critical thinking skills and is supported by TGT with stages, namely class presentations, teams, games, tournaments, and group awards accompanied by questions in interesting games and making students think broadly thereby spurring the increase and expansion of student knowledge (Pangestuti *et al.*, 2015).

Reading and concept map teams games tournament learning has a drawback, namely the absence of unique media to support the learning process. Unique media is needed to attract students to be active in the learning process, the right media in this case are picture cards and snake ladders as a complement to the reading and concept map teams games tournament learning. The form of the picture card and snake ladder media is a game of snake and ladder with a size (3m x 3m) and there are 30 boxes equipped with picture cards in the form of unique pictorial questions with sizes (10cm x 10cm) that are in each box of the snake ladder associated with the excretory system material.

In general, the benefits that can be obtained through the use of picture cards and snake ladder media are that the learning process can be more interesting, more interactive, the amount of teaching time can be reduced, the quality of student learning can be improved and the teaching and learning process can be carried out anywhere and anytime, and can improve students' reasoning abilities and student problem solving (Husein *et al.*, 2015). Amalia & Bintari (2016) also emphasized that the use of learning media can be remembered longer and can be easily re-expressed quickly and accurately. The learning material delivered using learning media stimulates various senses to understand it so that it can improve student learning outcomes.

Based on the description of the existing problems, it is necessary to have a study with the aim of (1) knowing the effect and (2) the difference in the increase resulting from the application of the "Reading Model and Concept Map Teams Games Tournament Assisted by Picture Card

and Snake Ladder on Students' Critical Thinking Skills in Excretion System Material. “

METHOD

The research subjects were students of SMP Negeri 18 Semarang class VIII D and VIII E. Class VIII D as the experimental class and class VIII E as the control class. The sampling technique in this study was purposive sampling, namely the sampling technique with certain considerations, namely class VIII D and class VIII E from a population of 8 classes, namely class VIII A to VIII H.

The type of research used is experimental research. The data collection methods in this study are as follows: (1) The interview method used to determine the learning process in the classroom, (2) The questionnaire method for the support of the test method, (3) The test method is used to determine the effect of implementing the reading and concept map teams games tournament model aided by picture card and snake ladder. Data analysis in this study is in the form of: (1) homogeneity test to determine whether the two classes are homogeneous and have the same ability before the study is proven by the F test where $F_{Count} < F_{Table}$, (2) Normality test is carried out after the two classes are homogeneous, normality test is used to determine whether the two classes are normally distributed where $\chi^2_{Count} < \chi^2_{Table}$ and to determine further test. If it is normally distributed, it uses parametric test analysis (t-test) and if it is not normally distributed it uses non-parametric analysis, (3) N-gain is used to determine the increase in learning outcomes after treatment, (4) The t-test related is a test parametric is used to determine the effect of the treatment which is said to be influential if $t_{Count} > t_{Table}$.

RESULT AND DISCUSSION

This research was conducted at SMP Negeri 18 Semarang in the 2019/2020 school year in class VIII D and VIII E. Class VIII D as the experimental class used the reading and concept map teams games tournament model assisted by picture card and snake ladder while VIII E as the control class used the teams games tournament model without assistance. In this study, there were six face-to-face meetings that were adjusted to the lesson plan, where one initial meeting was a pretest followed by four lessons and one final meeting was a posttest.

Based on this research, the results of data analysis can be seen in Table 1, Table 2, and Tab-

le 3 and Table 4.

Table 1. Results of the Pretest and Posttest Data Homogeneity Test

Data	Class	F_{Count}	F_{Table}	Criteria
Early	Experiment	1,14	1,83	Homogen
	Control			
Pretest	Experiment	1,46	1,83	Homogen
	Control			
Posttest	Experiment	0,57	1,83	Homogen
	Control			

Based on Table 1, the results of the initial data homogeneity test used the daily test value before the excretion system material which resulted in the two classes being homogeneous, where $F_{count} = 1.14 < 1.83 = F_{table}$. This is in accordance with Sugiyono (2018) that $F_{count} < F_{table}$, so the data is the same or homogeneous. The results of the homogeneity test were also carried out on the pretest and posttest data, where the pretest data was homogeneous because $F_{count} = 1.46 < 1.83 = F_{table}$. This is the same as the posttest data where the data is homogeneous because $F_{count} = 0.57 < 1.83 = F_{table}$. Based on the results of this analysis, student data in the experimental class and control class are homogeneous or have the same abilities so that a study can be carried out.

The results of the pretest and posttest have also been determined whether the data is normal or not and to determine the type of further data analysis using the normality test which can be seen in Table 2.

Table 2 Results of the Pretest and Posttest Data Normality Test

Data	Class	χ^2_{Count}	χ^2_{Table}	Criteria
Pretest	Experiment	1,46	1,83	Normal
	Control			
Posttest	Experiment	0,57	1,83	Normal
	Control			

Table 2 shows the results of the pretest and posttest data normality test for the experimental class and the control class. The results of the pretest data normality test for the experimental class were $\chi^2_{Count} = 5.52 < 11.07$ as χ^2_{Table} , while the control class produced $\chi^2_{Count} = 8.87 < 11.07$ as χ^2_{Table} . Based on this analysis, it was concluded that the pretest data of the two classes were normally distributed because $\chi^2_{Count} < \chi^2_{Table}$. The same result occurs in the posttest data where, the experimental class produced $\chi^2_{Count} = 3.69 < 11.07$ as χ^2_{Table} , while

the control class produced $\chi^2_{\text{Count}} = 6.21 < 11.07$ as χ^2_{Table} . Based on this analysis, it was concluded that the posttest data of both classes were normally distributed because $\chi^2_{\text{Count}} < \chi^2_{\text{Table}}$.

The results of the pretest and posttest which were normally distributed were used further tests with parametric statistics, namely the comparative t-test related. The t-test or two-difference test on average was used to determine the significant effect of the application of the reading and concept map teams games tournament model assisted by picture card and snake ladder on students' of excretion system which can be seen in Table 3.

Table 3. Results of the Pretest and Posttest Data T-Test Related

Data	Class	t _{count}	t _{table}	Criteria
Pretest	Experiment	-0,13	2,0003	There is no significant different
	Control			
Posttest	Experiment	10,47	2,0003	There is a significant different
	Control			

Based on Table 3 shows that the results of the t-test related pretest data there is no significant difference in students' critical thinking skills in the experimental class and the control class because the results of $t_{\text{count}} < t_{\text{table}}$ and H_0 are accepted. The results of the pretest data are the results before giving treatment to the experimental class and the control class. Different results occur in the posttest data, where the results of the t-test related to posttest data have a significant difference in the influence of students' critical thinking skills between the experimental class and the control class after giving the remap team games tournament assisted by picture card and snake ladder treatment because the results of $t_{\text{count}} = 10.47 > 2,0003$ as t_{table} and H_0 is rejected.

This significant effect leads to an increase in students' critical thinking skills which can be analyzed using N-gain. The N-gain analysis aims to determine the improvement of students' critical thinking skills at the 0th meeting or pretest to the 6th meeting, namely posttest. The results of improving students' critical thinking skills can be seen in Table 4.

The N-gain value in Table 4 shows that the experimental class is higher than the control class. The experimental class got an N-gain value of 0.80 in the high category, while the control class was 0.38 in the moderate category. This category is in accordance with according to Purna-

mawati *et al.* (2017) show that N-gain is $0.3 < g < 0.7$ in the moderate category and $g > 0.7$ is in the high category.

Table 4. Results of N-Gain Critical Thinking Skills

Class	Data	Average	N-gain	Criteria
Experiment	Pretest	73,41	0,80	High
	Posttest	94,59		
Control	Pretest	73,59	0,38	Moderate
	Posttest	83,57		

Increasing critical thinking skills are also measured on each existing indicator and analyzed descriptively. The data is calculated based on the pretest and posttest data. This assessment is compiled based on the ten indicators used according to Ennis (2011). Indicators of critical thinking skills according to Ennis (2011) are (1) Focusing on questions, (2) Analyzing questions, (3) Asking and answering questions about challenges or explanations, (4) Considering the accuracy of sources, (5) Observing and considering reports of observations, (6) Inducing and considering the results of the induction, (7) Educating and considering the results of the deduction, (9) Defining terms, (10) Identifying assumptions, (11) Deciding on an action. The percentage of students' critical thinking skills attainment for each indicator can be seen in Figure 1.

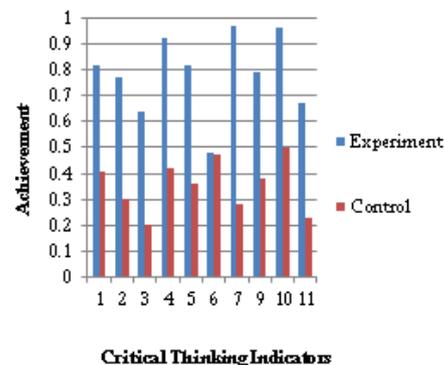


Figure 1. Critical Thinking Indicators

Based on Figure 1, it can be seen the difference in each indicator. Each indicator in critical thinking skills in the experimental class and control class has a different percentage. This figure shows that the analysis of critical thinking skills in the experimental class is better than the control class.

Figure 1 shows that the indicator with the highest achievement is (7) Educating and considering the deduction of 0.97 with high criteria

compared to other indicators. The increase in this indicator can occur because there is an influence from the provision of treatment in the form of a reading model and a concept map of the team games tournament assisted by picture cards and snake ladder in learning that improve students' critical thinking skills. This is proven without the application of the reading model and concept map of the team games tournament assisted by picture card and snake ladder, the results of the increase in the average control class on the indicators of deduction and considering the deduction results are only 0.28 with low criteria. Another cause is the habit of students in learning often analyzing a material that is general in nature and then converging to something that is specific, such as in this excretory system material.

Different results obtained by indicators (6) Induce and consider the results of induction as the indicator with the lowest achievement, namely 0.48 with moderate criteria compared to other indicators. The results of the analysis show that the similarity of achievement with learning without applying the reading model and the concept map of the team games tournament assisted by picture card and snake ladder in improving critical thinking skills is 0.47 with moderate criteria.

Lack of skills in students so that students still have difficulty in drawing conclusions on questions that contain induction indicators and consider the results of induction. The problem on this indicator requires more accuracy where the conclusions obtained from the problem must be reconsidered in relation to the correct result. In contrast to the deduction indicator and considering the results of the deduction, the induction indicator requires two times the consideration to produce the truth of the existing problem, because students have to think from something specific and explain it to the general thing. The explanation from the specific thing to the general thing allows an existing problem to be wider and there are many things that can be the reasons for the problem.

The inadequate role of the picture card and snake ladder media is also a factor in the low achievement of the induction indicator and considering the results of the induction. This is according to Rahman (2012), the decline in learning outcomes achievement can occur due to the less optimal learning media that is applied because there are disturbances in its application. These disorders include: verbalism, misinterpretation, double attention, and the formation of meaningless perceptions.

The less than optimal role of teachers is

also a factor in the low results obtained by students in addition to learning models and media. The presence of teachers is very important to create a conducive atmosphere, attract and improve student learning outcomes. This is consistent with the research of Umayah *et al.* (2013) teachers must be able to make teaching more effective as well as interesting so that the subject matter delivered makes students feel happy and feels the need to study the material which has an impact on improving student learning outcomes.

Based on the results of this analysis, there are still some shortcomings resulting from the application of the reading learning model and the concept map of the team games tournament aided by picture cards and snake ladders. However, overall it can be concluded that in the application of the reading model and concept map of the team games tournament assisted by picture card and snake ladder in the experimental class the students got better results than the control class. Another result that can be seen from the application of this model is that students are more likely to be active because in the learning process using picture cards and snake ladder games makes students more active and can learn while playing so that the learning atmosphere is not monotonous. Kurniawan & Maryani (2015) state that a conducive environment can increase activeness and critical thinking skills, whereas if the environment is not conducive it will reduce students' activeness and critical thinking skills so that it is difficult to instill concepts in students.

This is supported by research by Rofi'ati *et al.* (2014) where the learning process using pictures and games makes students more motivated to learn so that in the end it will improve learning outcomes. This is in accordance with Amalia & Bintari (2016) where the use of learning media can be remembered longer and is easy to re-express quickly and precisely, because learning using media stimulates various senses to understand it so as to improve student learning outcomes. Noviyanti (2013) adds that picture card media is effectively used in the learning process on abstract material because it clarifies the material and improves students' thinking skills.

The technique of combining the learning process with games is a strategy that teachers can use to facilitate the learning process in the classroom. Students feel happy learning, increase their knowledge and skills when using the game method in the learning process (Faris *et al.*, 2018). The same thing was stated by Widayanti & Slameto (2016) that the cooperative model is needed in learning because it improves cognitive and mo-

ral development in children and skills in thinking.

This is supported by Ainun (2015) where the cooperative learning model type Remap teams games tournament allows to improve thinking skills by using games, students can practice more and more varied questions in a fun way so that students do not feel bored and remain excited about taking lessons. because the learning activities are adjusted to the components in the Remap Teams games tournament. The form of learning can be seen more clearly as follows:

1. Reading and Concept Map

Reading is a phase that is carried out at home before learning to help students prepare before learning and the reading stage makes students remember, understand and analyze the material, after that it is continued with making a concept map. At the stage of making a concept map students are asked to write briefly what has been learned from the reading stage to make it easier for students to learn and to provide an overview of the material to be studied.

2. Class Presentation

The material in the teams games tournament was introduced for the first time in a presentation in the classroom by the teacher in the form of a stimulus that made students really focus on the material and the team games tournament unit assisted by picture cards and snake ladders.

3. Groups

Teams consist of four or five students who represent the entire class in terms of academic performance, gender, race and ethnicity. The main function of this team is to make sure that all team members are really learning well. Each group contains students with heterogeneous abilities from low to high so that in the group discussion is created and exchanges of ideas to analyze student discussion sheets given by the teacher. This discussion stage plays a role in improving critical thinking skills because it makes students analyze something and supports the 2013 curriculum, namely the student center.

4. Picture Card and Snake Ladder

This stage relates to the tournament stage in the form of a big game played by all groups at one time. The game is a picture card and snake ladder which is played on the field and as a form of joint evaluation after the Teams stage.

5. Giving Gifts

Teams get additional scores or other awards

if their average score reaches certain criteria.

CONCLUSION

Based on the results of the research, it can be concluded that the results of research that have been carried out at SMP Negeri 18 Semarang, it can be concluded that the reading learning model and the concept map of the team games tournament assisted by picture cards and snake ladders applied to the excretion system material have an effect on students' critical thinking skills which is proven. with the results of the t-test related where before treatment $t_{\text{Count}} = -0.13 < 2,0003 = t_{\text{Table}}$ while after giving treatment $t_{\text{Count}} = 10.47 > 2,0003 = t_{\text{Table}}$.

The results also showed a significant increase in students' critical thinking skills with the application of the reading model and the concept map of the team games tournament aided by picture card and snake ladder on the excretion system material with an N-gain of 0.80 (high) in the experimental class versus 0.38 (moderate) in the control class which applies the teams games tournament model without assistance.

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