

# Advance Organizer and TAI Learning Model, Which one Contributes to Student Learning Outcomes?

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**Abstract**—This study investigated the effectiveness of advance organizer and TAI learning model in increasing student's learning outcome in mathematics subject. This type of research is quasi experiment research involving 3 variables namely the concept map (X1), Team Assisted Individualization model (X2) and learning outcome variables (X3). The population of the research was the Seventh Grade Students of Junior High School with a total of 100 students. By using purposive sampling, Technique obtained samples as many as 75 people consisting of 3 classes, with 2 classes as a control group and 1 class as an experiment group. Based on the results of the data analysis, it can be concluded that the use of the advance organizer model with maps concept gives a higher contribution to the improvement of student learning outcomes than Team Assisted Individualization (TAI) and Conventional models.

**Keywords**—*advance organizer, TAI model, learning outcome*

## I. INTRODUCTION

One of the indicators of quality education is the satisfaction level of society against the product resulting in an educational institution. The indicator of education quality, teachers as an actor in the process, provides a share for quality education. Through its ability to manage the learning process that begins with good planning will have an impact on the success of students in mastering the learning material. Mastery of the learning model will provide an attractive atmosphere for students in following the instruction. Teachers are expected to have creative ideas in designing learning [1]. Teachers are expected to devise strategies and approaches that can make the students learn and understand and feel the benefits of studying mathematics. Teachers need to have special abilities to help students understand the material being presented as raised in Sanjaya that a teacher is a person charged with the responsibility of helping others to learn and to behave in new, different ways [2]. Utilization models of planned learning vary greatly depending on the basic capabilities which belonged to learners as well as the substance of the material presented.

Mathematics as a subject which requires learning strategies that can help students in mastering math material presented. The learning activity is designed to be very helpful in understanding the material. According to Ratumanan teaching mathematics is currently giving less attention to the student's activities, because the teacher is placed as a source of knowledge and serve as a transfer of

knowledge [3]. In the previous research, it is known that not all teachers use a variety of instructional model in the selection of constructivism-based so students cannot show creativity in thinking to solve mathematical problems given. Besides learning activities shown leads to the overloading of learning because learning atmosphere that is monotonous. There is still an error committed students in solving a problem of similar tribes in particular on the use of algebraic operations. Understanding of the material prerequisites for less controlled so that there is a mistake in completing the next step. Mastery of the material is still weak against the Association. Therefore, the model of learning which is considered able to provide opportunities for students to associate any concept in mathematics is the advance organizer with a strategy map concept. Utilization of concept maps can help students in directing his thinking process is so well structured when it resolved the issue. According to Harahap & Harahap learning model of the advance organizer with the help of concept maps can assist students in setting the initial learning process and can associate a new concept with the concepts that had existed in the cognitive structure so that the process of learning more meaningful and learning process became more structured [4].

Therefore, the use of advance organizers is expected to provide opportunities at the learners to relate the material to one with other material so that it formed systematic knowledge structures in order to assist in the problem resolution. The concept of linking to each other can be done using the strategy map concept. A concept map is a strategy that makes it easy for someone to process his understanding of knowledge. Cañas & Novak said that "*Concept map are graphical tools for organizing and representation knowledge. They include concepts, usually enclosed in circles or boxes of some type, and the relationship between concepts indicated by a connecting line linking two concepts*"[5]. This explanation shows that by using concept maps as a bridge in connecting math concepts that are related to each other students will better understand the material being taught. By using concept maps, students are taught indirectly to develop thinking skills and creative thinking. In this study, it is expected the utilization of creative thinking can be developed so as to contribute to the student in constructing his knowledge against the material studied algebra.

In addition to the advance organizer as a learning model that will be used, there are models of learning Team assisted

Investigation (TAI) used in the study. The use of this model is based on the idea that students when it enters the Environment Education in particular learning activities that followed they have diversity in thought processes as well as other conduct. This advanced Slavin that there needs to be an adaptation of teaching that pays attention to individual differences related to the ability or achievement of them when they learn in small groups [6]. Thus this model still gives you a chance to work in a group but give priority to the learning which is done individually, meaning that students are given the opportunity to develop their ability individually and then share your knowledge in the Group of. According to Slavin in Tarim & Akdeniz learning model cooperative learning combines TAI with individual-based learning. In this study, the use of these models is expected to contribute to the improvement of the results of the study with fixed pay attention to the characteristics of the individual [7]. In real use of these models almost do not execute well, so teachers are experiencing constraints in doing this model.

To find out the use of these learning models and compare effectiveness, so it takes a model comparison study of learning model that is direct or conventional learning model. In the settings of the conventional model is implemented by using the concept of learning directly (direct learning) teacher-centered learning. The problem examined in this study are: 1) is there any difference results of students taught with the model of Advance Organizer with the approach of the concept map, a Model of learning Conventional Learning Model and TAI? 2). Where is the third among the model contributes to the improvement of student learning outcomes?

## II. RESEARCH METHODS

This type of research is quasi-experiment research involving 3 variables namely the concept map (X1), Team Assisted Individualization model (X2) and learning outcome variables (X3). The population of the research was the Seventh Grade Students of Junior High School with a total of 100 students. By using purposive sampling, Technique obtained samples as many as 75 people consisting of 3 classes, with 2 classes as a control group and 1 class as an experiment group. Data analysis techniques used descriptive statistical analysis techniques and inferential statistics. Descriptive analysis techniques provide an overview of the position of students in the category of Excellent, Good, Fair, Less and Very Less with the value conversion criteria proposed by Ratumanan & Laurens [8].

The hypothesis to be tested by formulated in the form of  $H_0: \mu_1 = \mu_2$  that there is no difference in the average learning outcomes of the three samples and  $H_a: \mu_1 \neq \mu_2$  that there are differences in the average learning outcomes of the three samples. Hypothesis testing using the variance analysis technique with the F test. The test criteria are accepted  $H_0$  if the  $F(\text{count})$  value  $\leq F$  table value or the significance  $\alpha < \alpha$  value is determined. To determine which of the three variables provides the biggest contribution, the Tukey's HSD test is used using the formula proposed by Irianto [9]. The use of this statistical test is preceded by testing the prerequisite analysis by testing the normality and homogeneity of the data. The formulation of the hypothesis for testing normality is  $H_0: \mu_1 = \mu_2$  that is the sample is normally distributed and  $H_a: \mu_1 \neq \mu_2$  that is the sample is not

normally distributed. The statistical test formula used refers to Siregar [10].

## III. RESULTS AND DISCUSSION

The below table shows pre-test result of students related their ability in mastering algebra material:

TABLE I. THE PRE-TEST DATA RESULT OF STUDENTS

Class	Average Value	Standard Deviation
A	72.6	9.1
B	73.8	5.2
C	72.0	8.4

Based on these data, two experimental classes are defined, namely, class A and C with the assumption that the average is relatively the same and class B as the control class. To find out the progress of students' ability to the taught algebra material, 4 meetings were held ended with the giving post-test. The data of the test results are then converted into a five-scale benchmark reference approach.

TABLE II. THE POST-TEST DARA RESULT OF STUDENTS

Qualification	Interval	Value		
		Class A (AO / PK)	Class B (TAI)	Class C (control)
Excellent	$X > 90$	2	2	0
Good	$75 < x \leq 90$	11	7	3
Enough	$60 < x \leq 75$	7	8	8
Less	$40 < x \leq 60$	5	8	15
Very Less	$X \leq 40$	0	0	1
Total		25	25	25

In relation to the use of variance analysis statistical techniques, it is necessary to prerequisites test to determine the normality and homogeneity of the data. Normality test results show that the data obtained by the data derived from a normally distributed population. This is indicated by the results of chi-quadrat test using the SPSS program version 20, showed that the significance value  $\alpha$  for learning outcomes variable with the *advance organizer* approach is 0.98 greater than 0.05, the TAI approach is 0.89 greater than 0.05, and the conventional approach 0.91 is greater than 0.05.

The results of the homogeneity data to be analyzed using the two variance similarity test techniques, namely the *Levene* test with a significance value  $\alpha = 0.65$  greater than 0.05, so it is concluded that the three groups of data have the same variance or the data to be analyzed derived from a homogeneous population. Because the data obtained to meet the criteria of homogeneity and normality, then we analyzed using variance analysis statistical techniques with the F test. Based on the results of statistical tests, generally, the data relating to hypothesis testing are summarized in the following table.

TABLE III. CALCULATION RESULTS OF ONE WAY ANOVA

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	2740.756	2	1370.378	6.347	0.003
Within Groups	15545.451	72	215.909		
Total	18286.207	74			

The calculation results in table 3 show that the calculated value of F is 6.347 with degrees of freedom (df) 2 and 72 greater than the F tab of 3.12. When compared to the significance value  $\alpha$ , it is seen that the significance of calculation results  $\alpha$  is 0.003 less than the specified value of  $\alpha$  0.05. This shows that the hypothesis research formulated statistically to be tested is rejected, which means that there are differences in learning outcomes from the three models used in learning. To find out which of the three models tested contributed to the improvement of learning outcomes, the analysis test was carried out after the ANOVA test using the Tukey HSD test. The results of the analysis show that the value of HSD = 9.99. When compared with the difference in the average values of the variable  $X_1$ ,  $X_2$ , and  $X_3$ , then the significant difference is the average learning outcomes of students taught with *advanced organizer* and conventional models, with the highest contribution is the *advance organizer* model.

Data from the descriptive statistical analysis showed that students with excellent categories are in *advance organizer* and TAI class, but in good categories dominated by students in *advance organizer* class and in conventional class are more focused on categories with fewer intervals. These data indicate that in general, the students taught with the *advance organizer model* have a better qualifications mastery of the material than other students. If observed from the average of initial ability, it can be seen that the average value of students in the class taught with the conventional model is lower than the two experiment class, but the average value of the two experiment class is the same.

After being treated, there is a change in the value of learning outcomes in experiment class where the control class is lower than the experiment class. These changes show that there are significant differences in the learning outcomes of students who are taught by the three models. This is evidenced by the rejection of the hypothesis tested. If you pay attention to the background of the use of the three models, it can be said that the three models are differences in the syntax also in the purpose of its use. *Advanced organizer* models provide opportunities for students to understand mathematical concepts in a structured and systematic manner. The learning model has based on Ausubel's thought in Yamin that learning is an activity that connects concepts to produce a complete understanding so that the concepts learned will be well understood and not easily forgotten [11]. Comprehensive understanding of mathematical concepts will be better if the interrelationship between concepts can be structured in a person's memory. One of the learning approaches used is a maps concept. By linking interrelated concepts, the whole mathematical concept learned will be well mastered.

In learning activities using maps concept in classes taught with the *advance organizer* model students are initially confused, but after being explained about how to create a maps concept students can do it. Learning activities in this class, besides learning about the steps to create a maps concept, they are also required to complete the given Activity Sheet. The aim is to find out whether they can understand the results of the maps concept that are made. Another thing seen in learning activities in this group is the sense of responsibility, respect and help each other in the group during the learning process. In addition, through discussion activities, students are encouraged to exchange

information. According to Sanjaya through team learning students are encouraged to exchange information and opinions, discuss the problems together, compare their answers and correct things that are not right. Another thing that can be observed in the use of this model is the emergence of students' thinking creativity in designing the maps concept model created [2]. *Advance organizer* with maps concept can also foster a great curiosity about what students learn, improve students' cognitive structure and can connect new concepts received. This is consistent with the opinion of Fatayati that students can actively connect or relate new information received and existing in building their cognitive structure so that the learning process is more meaningful [12]. In relation to the formation of a structured concept using this model, an *advance organizer* is also an idea that provides opportunities for students to associate each new material in learning. Rohadi & Alfana suggested that an *Advance organizer* is an aid for students to learn new material or integrate new ideas into existing ideas [13].

Another learning model used in this study is *Team Assisted Individualization* (TAI). This model is one of the cooperative models that emphasize the activities of students in small groups, where students first learn individually and then discuss the problems in the group. The role of the teacher in learning with this model is as a facilitator who is ready to help groups or individuals who need help. In the use of this model there are 5 groups of students who work individually then their work is discussed in groups. In its activities, there are several things that are observed, namely there are students who have the ability to master the material that is better to help their friends in the group who are wrong or have not mastered the material well. This shows that there is a collaboration between students and helping each other. When compared with the model *Advance Organizer*, students in this group only work on the Activity Sheet without the need to creatively show other ways or other models than what is contained in the Activity Sheet. However, the interaction that occurs between individuals in the group shows that there is good cooperation so that there are corrections to some errors made in the group. Student activity is very important in the learning process as stated in Government Regulation 2005 Article 19 Chapter IV that the learning process in education units is organized interactively, fun, challenging, motivates students to active participation, and provides sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students. Interaction in cooperative groups provides opportunities for students to show positive attitudes such as being responsible, helping each other, and also discipline.

Based on the research data, it can also be seen that the number of students taught with the TAI model is at all categories, although more in the category of enough and less. This shows that the results obtained by students in learning algebra material although better than conventional models but still need improvement in mastering the material, meaning that there needs to be attention to learning individually and also when group discussions occur. Teachers need to pay more attention to when group interactions occur. Teachers need to be aware that students have very diverse abilities. Therefore teachers need to provide services individually according to the characteristics of students. Teacher's mastery of pedagogic competence, in this case, the characteristics of students is very important.

According to Laurens et al., the development of character values can be designed in learning activities [14].

If the initial data of this study is observed, it can be said that students in the group that becomes the control class have a higher average, but after comparison with the experimental group, the learning outcomes obtained are focused on the lesser category of 15 students. This shows that conventional learning with the lecture method does not have a positive impact on improving learning outcomes because it is only limited to what the teacher says. This is consistent with the opinion of Sanjaya that one weakness of the lecture method is the mastery of the limited material in accordance with what is presented by the teacher, and this is the most dominant weakness [2]. In using this method, there is no activity that provides opportunities for students to develop high-level thinking processes. This certainly has an impact on mastering abstract mathematical objects. According to Ratumanan & Laurens, one of the causes of the low mastery of mathematical objects is the low quality of learning in addition to the qualifications and competencies of teachers and also the culture of the learning [8].

Analysis of the use of these three learning models shows that the *advance organizer* model contributes highly to the improvement of student learning outcomes based on the results of the Tukey HSD test. This difference is certainly based on learning planning that is in accordance with the characteristics of each model. The *advance organizer* model and the TAI model are developed based on constructivism learning theory which emphasizes the construction of knowledge by students themselves. Therefore learning is designed so that students can interactively develop higher-order thinking skills. The ability to higher-order thinking according to Miri et al. which is included in the ability to higher-order thinking is the ability to think critically, logically, reflective and metacognitive [15].

#### IV. CONCLUSION

Based on the results of the data analysis and discussion of this study, it can be concluded that the use of the advance organizer model with maps concept gives a higher contribution to the improvement of student learning outcomes than *Team Assisted Individualization* (TAI) and Conventional models. This is indicated by the high average value among the three groups which is strengthened by the results of the Tukey HSD test analysis. In other impacts, the use of maps concept as a strategy in this model provides an opportunity for students to develop creative thinking that

affects to the mastery of the material being studied. Other attendant impacts from the use of this model are the activities related to the character of responsibility, discipline, a collaboration when there is interaction in the study group, especially in groups of students taught with the TAI model. Based on the above conclusions, it is recommended for teachers in mathematics learning to use models, strategies or methods and techniques that provide opportunities for students to construct knowledge through creative and enjoyable learning activities.

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