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DIFFERENCES IN STUDENT LEARNING OUTCOMES USING CONCEPT ATTAINMENT MODEL AND ADVANCE ORGANIZER MODEL ON HEXAPODA MATERIAL

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ABSTRACT

The results of studying biology for class X SMA Negeri 18 Medan on Hexapoda are still low. Students still experience difficulties in learning Hexapod material because the material is very complex. This study aims to determine differences in student learning outcomes taught using the concept achievement model and the advance organizer model in Hexapoda material in grade 10. The research population was grade X SMA Negeri 18 Medan which consists of 3 classes namely X-IPA1, X-IPA2 and X-IPA3. Sampling was done by simple random sampling technique. The samples taken were class X-IPA1 as the class taught by the concept achievement model and X-IPA2 as the class taught by the advanced organizer model. This research is a quasy experiment research. The instrument used in measuring learning outcomes in this study was a test in the form of a multiple choice test totaling 20 questions. Hypothesis testing is done by t test with α = 0.05. Before being given treatment, the average pretest value for experimental class I was 51.3 and after being given treatment it was 84 while the average pretest value for experimental class II was 50.96 and after being given treatment it was 79.67. Based on these values, it is known that the average student learning outcomes in the experimental class I was higher than the experimental class II. The hypothesis test shows tcount>ttable, with dk 59, α=0.05 is 2.2670> 2.0009 which means there are differences in student learning outcomes taught using the concept achievement model and the advance organizer model on Hexapoda material.

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INTRODUCTION

The elements in the learning system are interrelated and have an influence to achieve goals. These elements include students, teachers, feedback, evaluation, learning models or strategies, learning media, learning methods, and learning objectives (Pribadi, 2009: 24). Basically, learning activities are carried out to create a learning system according to what was previously planned (Rusman, 2014: 71-72).

The reality on the ground, so far teachers have made a lot of innovations in lesson planning to assist teachers and students in creating, organizing, and organizing learning so as to enable learning events to occur in order to achieve learning goals. However, how to plan learning models that can generate student innovation itself is still very rarely implemented. In this case learning practices tend to ignore ideas, concepts and students' thinking abilities. The teacher's activity is more prominent than that of the students, and is limited to mere memorization. Learning is still expository, so it has not been able to generate a learning culture of 'learning how to learn' in students (Uno et al., 2018: 254).

The same problem occurred in class X SMA Negeri 18 Medan. The results of interviews with biology teachers stated that the material for the Hexapoda subphylum, especially the Insecta is the most difficult material for class X students to understand because the material is complex even though the teacher has done learning models such as direct learning models and independent learning models. The impact is 54% of students are not able to achieve the expected competencies. Rusman (2014: 79-80) states that if certain parts of the subject matter are not understood by most students, then improvements are needed to the learning program, especially with regard to parts that are difficult to understand.

Pratiwi et al. (2006: 215-225) states that Hexapoda comes from the word hexa which means six and the word podos which means foot. Members of the Hexapoda subphylum that have the most species in the world are insects (class Insecta). It is estimated by zoologists, the class Insecta (insecta) has more than 70,000 species. Saniati (2016: 7) states that the Hexapoda subphylum has a wide range and high species diversity. This makes it difficult for students to remember examples of species in the Hexapoda subphylum.

Alberta (n.d.: 1) suggests that the concept attainment model is a process of inquiry carried out by students in a structured way by comparing examples of positive concepts by contrasting them with examples of negative concepts provided by the teacher. Bhargava (2016: 699) explains that a concept is an image or mental representation of an experience or an object. Concepts are different from facts, principles and generalizations. The concept is a categorization of a group which can be in the form of objects, events, ideas, people, and so on in one or more general characteristics. The concept has certain features that are important to know and help them understand the concept well. These features include classifying concepts, combined and non-combining concepts, objective concepts and abstract concepts, samples, original models, definitions, number of concept adjectives, index adjectives, concept attributes, and concept attribute values.

Anjum (2014: 2456) states that learning that is carried out using the concept achievement model is one effective way to encourage students to improve higher-order thinking skills such as critical thinking skills, creative thinking skills, and so on. Research results in Risdawati et al. (2017: 174-175) reported that student learning outcomes after applying the Concept Attainment learning model in class XI SMAN 11 Bulukumba showed that the average level of student achievement after implementation was in the high category, namely 55.88%.

Alberta (n.d.: 1) states that several reasons for using the concept achievement model are: (a) students can determine the differences and similarities between one object and another, one word with another, one picture with another picture and so on, (b) encourage students to carry out scientific processes such as observing, classifying, classifying, submitting hypotheses and so on, (c) encouraging students to build their understanding of vocabulary in certain fields.

In addition to the concept achievement model, there is an advance organizer model. Sujana & Sopandi (2020: 78) defines that the advance organizer model is a deductive information processing model designed to teach content or material that is interrelated with students' previous knowledge. Sujana & Sopandi (2020: 79) states that apart from being able to improve students' cognitive abilities, the advance organizer learning model can also increase the retention of new information. Choudhary & Qamar (2015: 45) explains that the advance organizer model can be presented in the form of a concept map or in other forms such as discussions and brief arrangement of material introduced to students before lessons. Advance organizer provides support for the learning process and is presented before delivering new concepts. In this way the organizer provides operational instructions that allow students to explore new ideas and knowledge in a meaningful

way by associating these ideas with existing knowledge. The results of the research by Shabania et al. (2015: 75) reported that there was a significant influence on the application of the advance organizer learning model on student biology learning outcomes on the concept of protists.

In the national education system, the formulation of educational goals, both curricular goals and instructional goals, uses Benjamin Bloom's classification of learning outcomes which broadly divides them into three domains, namely the cognitive domain, the affective domain, and the psychomotor domain. The cognitive domain relates to intellectual learning outcomes which consist of six aspects, namely knowledge or memory, understanding, application, analysis, synthesis, and evaluation. The first two aspects are called low-level cognitive and the next four aspects include high-level cognitive (Sudjana, 2009: 22).

The purpose of this study was to determine differences in student learning outcomes taught using the concept achievement model and the advance organizer model in the Hexapoda sub-material in class X SMA Negeri 18 Medan.

RESEARCH METHOD

The type of research used is quasi-experimental research. This research was conducted at SMA Negeri 18 Medan Jalan Wahidin No. 15-A Medan from February to June 2021. The population in this study was class X SMA Negeri 18 Medan, which consisted of three classes, namely class X IPA1, X IPA2 and X IPA3. Sampling was carried out using a simple random sampling technique by drawing lots. The samples taken were class X IPA1 as the experimental class I which was taught by the concept achievement model and X IPA2 as the experimental class II which was taught by the advance organizer model. The independent variables in this study are the concept achievement model and the advance organizer model. The dependent variable in this study is student learning outcomes in biology learning in the Hexapoda sub-material.

The research data were collected using measurement techniques using achievement tests in the form of written formative tests and using the PAP (Basic Reference Assessment) scoring system. Sudjana (2009: 8) explains that the LAP assessment system is an assessment that is shown in the instructional objectives that must be achieved by students. Therefore, the level of student completeness is compared to the goals to be obtained, not compared to the class average.

The indicators measured following the learning objectives, namely: (1) identifying, differentiating, and communicating the morphological characteristics of Hexapoda, (2) explaining the basics of Hexapoda grouping, (3) observing and concluding information from the literature about how Hexapoda members reproduce, (4) identify members of each Hexapoda subphylum based on their characteristics, (5) identify the role of Hexapoda members for life, (6) propose alternative uses of Hexapoda for the development of science, technology, and the environment in society. The test is in the form of multiple-choice questions (multiple choice) totalling 20 questions. The test used is in the form of questions with 5 options (a, b, c, d, and e). The standard used in assessing learning outcomes in this study is the standard one hundred (0-100).

To obtain a set of questions that have adequate quality, an analysis of the items is carried out, namely: analysis of the difficulty level of the questions, analysis of discriminating power, analysis of validity and analysis of reliability. After the tests were tried out in higher grade (grade 11) and searched for test validation, it was found that from the 28 questions tested, 21 items were valid and seven items were invalid. The level of difficulty of the test obtained four questions in the difficult category, 18 items in the medium category and six items in the easy category. The differentiating power analysis of the test obtained five items in the very good category, 15 items in the good category, four items in the sufficient category, and 4 items in the bad category. Analysis of the reliability as a whole obtained a reliability coefficient of 0.8528 so that overall the test results were considered reliable. The data prerequisite test which includes the normality test and homogeneity test is carried out before the hypothesis test (t-test). Test the normality of the data using the Liliefors test. Fisher's test was used to test the homogeneity of the variance of the two data groups.

The hypotheses that were tested for validity in this study were:

H0: There is no difference in the learning outcomes of students who are taught using the concept achievement model and the advance organizer model in the Hexapoda sub-material in class X SMA Negeri 18 Medan

Ha: There are differences in the learning outcomes of students who are taught using the concept achievement model and the advance organizer model in the Hexapoda sub-material in class X SMA Negeri 18 Medan.

Hypothesis testing is done by t-test using the t-test formula which is used for independent samples (not paired/related) at a significant level

=0.05. The t-test was carried out by comparing the average (posttest) scores of students' learning outcomes after obtaining learning with different treatments.

RESULTS AND DISCUSSION

The data from this research are the results of student learning from two different classes as the research sample. The class taught uses the concept achievement model, namely class X IPA 1 and the class taught by the advance organizer model, namely class X IPA 2. Student learning outcomes in the class treated using the concept achievement model can be seen from the pretest scores and posttest scores. The average pretest score was 51.3 with the lowest score being 35 for 2 students and the highest score being 70 for 1 student. Meanwhile, from the results of the posttest, the average score was 84 with the lowest score being 70 by 3 students and the highest score being 100 by 2 students. In this study, it was found that the average difference in the experimental class I was 32.37, increasing from 51.3 in the pretest to 84 in the posttest.

Table 1. Pretest and posttest value data for experimental class I

Pre-test			*Post-test*		
Score	*f*	average	Score	*f*	average
35	2	51,3	70	3	84
40	3		75	4	
45	6		80	6	
50	6		85	7	
55	5		90	5	
60	4		95	3	
65	3		100	2	
70	1				
total	30		Jumlah	30	

Likewise, student learning outcomes in classes that were treated using the advance organizer model can be seen from the pretest scores and posttest scores. The average pretest score was 50.96 with the lowest score being 35 by 2 students and the highest score being 70 by 2 students. While the results of the posttest obtained an average value of 79.67 with the lowest score of 70 for 4 students and the highest score for 95 for 1 student. In the experimental class II, the average difference was 28.71, increasing from 50.96 in the pretest to 79.67 in the posttest. This is in line with the results of research by Shabania et al. (2015: 75) which states that the use of advance organizers can improve students' ability to learn new information because it is a framework that contains basic and general concepts related to all the material they will learn.

Table 2. Data on pretest and posttest values for experimental class II

Pre-test			*Post-test*		
Score	*f*	average	Score	f	average
35	2	50,96	70	4	79,67
40	4		75	8	
45	7		80	9	
50	6		85	7	
55	4		90	2	
60	3		95	1	
65	3				
70	2				
Jumlah	31		Jumlah	31	

Differences in learning outcomes can be seen in the acquisition of student scores in both research classes, in experimental class I (concept achievement model), the lowest student score is 70 for as many as 3 students and the highest score is 100 for as many as 2 students, while in the experimental class II (advance model organizer), the lowest student score is 70 as many as 4 students and the highest score is 95 as many as 1 student. The difference in posttest scores for the concept achievement model class and the advanced organizer model class can be seen in Figure 1. Figure 1 it is shown that the scores obtained by students in the lowest concept achievement model class are 70 with a frequency of 3 and the highest score is 100 with a frequency of 2. Meanwhile, in the advanced model class organizer, the lowest score is also 70 with a frequency of 4 and the highest score is 95 with a frequency of 1.

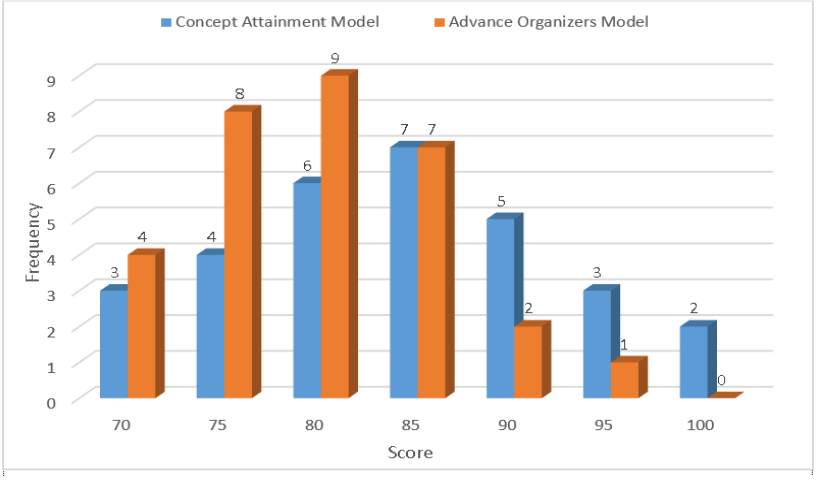

Figure 1. Posttest Results Difference Diagram in Concept Achievement Model Classes and Advance Organizer Models

Based on the data normality test conducted using the Liliefors test, it was found that the pretest and posttest values for the two sample groups had normal data or L-count <Ltable at a significant level of 0.05 and n1 = 30 and n2 = 31 for the experimental class. The results of the pretest and posttest normality tests for the two classes are presented in Table 1. In Table 1, it was obtained that the class sample that applied the concept achievement model obtained L-count = 0.1243 (pretest) and L-count = 0.1195 (posttest), while in the class that was applied For the advance organizer model, the prices for L-count = 0.1523 (pretest) and L-count = 0.1576 (posttest). Based on the test criteria, namely accepting samples from normally distributed populations if Lcount <Ltable and rejecting the test criteria if the conditions are not met. From Table 1, the values obtained for L-count <Ltable, it can be concluded that the sample comes from a normally distributed population.

Table 3. Results of normality test analysis

Data	L_{count}	L_{tabel}	status
Pretest experiment I	0,1243	0,1610	Normal
Pretest experiment II	0,1523	0,1591	Normal
Posttest experiment I	0,1195	0,1610	Normal
Posttest experiment II	0,1576	0,1591	Normal

Based on the results of the pretest homogeneity test for the experimental class I and experimental class II, the value of F-count = 1.1343 was obtained from the F distribution price table with a significant level of α = 0.05, so the value of F-table = 1.8542 was obtained. Because the value of Fcount <F-table, it can be concluded that the pretest population data for the experimental class I and experimental class II are homogeneous. Whereas for the posttest experimental class I and experimental class II obtained Fcount = 1.7894 with F-table = 1.8474 then F-count <F-table so it can be concluded that the posttest population data in experimental class I and experimental class II are homogeneous. The calculation results are presented in Table 2.

Tabel 4. Uji homogenitas data *pretest* dan *posttest* kelas eksperimen I dan kelas eksperimen II

Data	Sampel	Varians	F_{count}	F_{tabel}	annotation
Pretest	Pretest experiment I	84,36	1,1343	1,8542	Homogen
	Pretest experiment II	95,69			
Posttest	Posttest experiment I	71,38	1,7894	1,8474	Homogen
	Posttest experiment II	39,89			

The initial ability of the two sample groups of class X IPA SMA Negeri 18 Medan on Hexapoda material before being given treatment was carried out by giving a pretest. It is known that the average for the experimental class I was 51.3 and 50.96 for the experimental class II. Based on the results of the t test, it showed that the two experimental classes had no difference and were still relatively low. This is because students have not received learning about Hexapoda material. Hypothesis testing is done by t test with a significant level □ = 0.05. The t-test was carried out by comparing the average (posttest) scores of students' learning outcomes after obtaining learning with different treatments. From the results of the data calculation, it was obtained that the final student score with an average in the concept achievement model class was 84 with an SD of 8.44 and in the advanced organizer model class of 79.67 with an SD of 6.31. The calculation results are briefly shown in Table 3.

Table 5. Summary of t-test calculations

Sampel	average	T_{count}	t_{tabel}	conclusion
Kelas eksperimen I	84	2,2670	2,0009	Significantly difference
Kelas eksperimen II	79,67			

Based on the t-test calculation results table above, a tcount of 2.2670 is obtained. Meanwhile ttable (dk = 59) at a significant level of 0.05 is 2.0009. This means that tcount is greater than ttable (t-count > t-table), so that Ho is rejected and Ha is accepted. Thus, it can be interpreted that there is a significant difference in the learning outcomes of biology class X IPA students at SMA Negeri 18 Medan who are taught using the concept achievement model and the advance organizer model. The difference can be seen in the average score of student learning outcomes in classes taught using the concept achievement model which is higher than the class using the advance organizer model, namely 84 and 79.67, with a difference of 4.33 as shown in Figure 2.

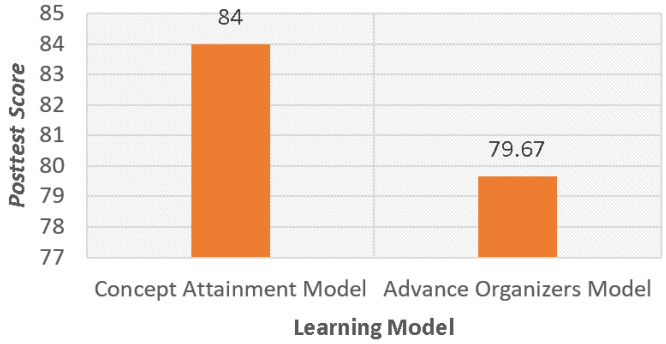

Figure 2. Diagram of the Differences in Average Student Learning Outcomes (Posttest) in the Concept Achievement Model Class and the Advance Organizer Model

From the difference in the average learning outcomes it is known that student learning outcomes using the concept achievement model are better because during the implementation of the research and also in accordance with the opinion of Alberta (n.d.: 1) that in the concept achievement model students can determine the differences and similarities between members of the Hexapoda one with other Hexapoda members, encouraging students to carry out scientific processes such as observing, grouping, classifying, submitting hypotheses, and encouraging students to build their understanding of vocabulary in the Hexapoda sub-material. This does not contradict the opinion of Joyce et al. (2009: 125) which states that the concept achievement model is a learning model designed to improve inductive thinking skills, and to analyze and develop concepts in students'

personalities. Lesson (in Sujana & Sopandi, 2020: 52) explains that although in implementing the concept achievement model students must understand that the hypotheses they propose may be inaccurate the first time they are proposed, the concept achievement model allows students to become more comfortable in using the approach. trial and error in the problem-solving process contained in the learning of the Hexapoda sub-material.

The advanced organizer model can improve learning outcomes because it allows students to learn new ideas or information meaningfully by associating these ideas with previous knowledge. This agrees with Atomatofa (2013: 82) stating that the advanced organizer model supports higher achievement and retention capabilities and facilitates the acquisition of more scientific concepts. Even though the advanced organizer model can improve learning outcomes, the average student learning outcomes in the advanced organizer model are not higher than the concept achievement model in the Hexapoda sub-material because during the research implementation and following the opinion of Sujana & Sopandi (2020: 86) which explains that the weakness of the advance organizer is that not all students have sufficient initial knowledge to take part in learning, so they experience difficulties in associating new knowledge with previous knowledge.

The different implementations led to different final results between the experimental group which was taught using the concept attainment model and the experimental group which used the advanced organizer model. Nyonita et al. (2014: 25) explain that the difference in learning outcomes in the cognitive domain occurs due to differences in the stages of activity between the two learning models which cause different student learning experiences and how high students' understanding of learning material is also different. Kusdiwelirawan et al. (in A'yuni & Nasution, 2016: 16) explain that student learning outcomes are influenced by internal factors and external factors of student life. If this statement is related to the results of the study, it can be stated that external factors are in the form of treatment when learning with different learning processes and steps.

CONCLUSION

The learning outcomes of students who were taught using the concept achievement model in the Hexapoda sub-material in class X SMA Negeri 18 Medan obtained an average score of 84. The learning outcomes of students who were taught using the advance organizer model in the Hexapoda sub-material in class X SMA Negeri 18 Medan obtained an average value of 79.67. There are differences in the learning outcomes of students who are taught using the concept achievement model and the advance organizer model in the Hexapoda sub-material in class X SMA Negeri 18 Medan which is known from the value of t-count > t-table (2.2670 > 2.0009) so that Ho is rejected and Ha is accepted.

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