The Comparison of Concept Attainment Model and Treffinger Model on Learning Outcome of Al-Kautsar Senior High School Bandar Lampung

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Abstract. The objective of this research was to discern the differences between the Concept Attainment Model and the Treffinger model on students' learning outcomes of the cognitive and affective domains. The sample of the research consisted of XI Science 5 and XI Science 4 students collected by employing the random sampling technique. The researcher managed using a quasi-experimental design. The obtained data were analyzed using normalized-gain through Microsoft Excel 2010 to know the increase in students' academic achievement. The data of the Pre-test and Post-test was statistically examined by administering a normality test, homogeneity test, and t-test. The average cognitive domain on concept attainment class showed that N-gain was 0.37 and 0.58 on Treffinger class. The statistical examination further showed that \( t_{observed} > t_{critical} \) which meant \( H_0 \) was rejected and \( H_1 \) was accepted. The average effective domain was 82.87% for concept attainment class and 84.90% for the Treffinger class. Treffinger model, according to the results of N-gain and the percentage, was better at the outcome comparing to the concept attainment model. Referring to the result of the \( t \)-test, it also indicated that there was a significant comparison between the Treffinger model and the concept attainment model towards academic achievement especially the cognitive domain showed by \( t_{observed} > t_{critical} \).

1. Introduction
Learning is a process or an activity of teaching and learning among teachers and students aimed to achieve learning objectives from any sources gained from the learning environment encompassing teachers and students that communicate with each other[1]. In the learning process, not only the result of learning that becomes a focus or reference but also abilities to deliver opinions, thoughts, or ideas, based on the concept learned during the process[2]. That thing becomes the cause of failing to approach the maximum result so that one of the aspects as a referral in the modern era to define the quality of education is physics education[3]. The advancement of physics in the field causes scientists to rightfully more proud, however, there are many students do not like physics then the world feels dark[4]. Learning physics is judged as a difficult subject and many students avoid it. In its learning process, many students would skip it for many reasons. Many students do not like learning physics and even hate it[5]. Based on the preliminary research, the result of students' cognitive domain was low and many students felt that it was difficult to understand physics and its concepts; unable to elaborate it by their language; inefficient of choosing learning model with the basic competence and students’ environment; students’ inability to comprehend the material; lack of students’ enthusiast during the
process of learning and failure of class management. The learning models used by Al-Kautsar Senior High School are conventionally by speech, question-and-answer and performing the task. The result of the affective domain of students is also seen as low observed by the lack of confidence in delivering their perspective, in carrying out or answering questions as well as in cooperating throughout the process of learning.

The problems described in which matter to be solved are on how to choose the appropriate and enjoyable model of learning that one may result in the maximum outcome of students[6]. Enjoyable learning can be administered by setting up a model of learning where it increases the creativity of students [7]. The model that increases students' creativity and their achievement in learning is the Concept Attainment Model and Treffinger model. Concept Attainment model is a learning model that aims to accomplish and to assist students in understanding the new concept[8]. Indicator of Concept Attainment model relates to Inductive learning model, where both are designed to analyze the concept, develop it, apply it in teaching and help students to be engaged in the learning process and involve students' mental operation and has its parts such as advantages and disadvantages, benefits, steps of learning. The advantages of this model are that it can improve students' understanding of the concept and increase their achievement in learning [9]. Treffinger model is one of the models in learning that has its approach to resulting creative thinking and creativity. Indicators of this model are encouraging students to be enthusiastic and developing students' understanding of the concept. The advantages of this Treffinger model can advance students' cognitive and affective thinking so it enhances the students' results of learning[10]. According to some previous research, the students were challenged and involved when they had to solve problems and found new concepts by uttering their ideas if the Concept Attainment Model and model Treffinger were applied[11]. The difference between the previous research that it was only finding out the influence of the model and comparing it to the more conventional model, thus the modern one produced better results[12].

The learning outcome is an indicator of success achieved by students after following learning activities where it can be stated or defined in the form of a number or alphabet [13]. Learning outcome can be known through some evaluations which can describe the cognitive, affective and psychomotor domain,[14]. This research, however, focused on the cognitive and affective domain since the limitation of time on doing the research. As the problems explained, one of the solutions to overcome issues regarding the process of learning and to increase learning outcomes was by applying the learning model. From the previous research, it stated that using the Concept Attainment model could enhance the learning completeness of students[15]. Treffinger model could also increase students' understanding of the concept and so does the learning outcome[16]. Concept Attainment model is a learning model that approaches students' concept of understanding thus it impacts to pass the Minimum Criteria of Mastery[17]. Treffinger model is a learning model that refers to critical thinking on finding new concepts[18].To find out the comparison of learning outcomes, this research is about the comparison of the concept attainment model and the Treffinger model on learning the outcome of tenth-grade students.

2.Method
This research was conducted at Al-Kautsar Senior High School Bandar Lampung. This research was quantitative research using quasi-experimental design, specifically the Pre-test-Post-test control group design consisting of 2 classes namely experimental class 1 and experimental class 2 with different treatment. The sampling technique used was random. The sample chosen was XI Science 5 as experimental class1 (Concept Attainment Model) and XI Science 4 as experimental class2 (Treffinger Model). The material taught was static fluids. After testing the hypothesis, it can be known that there was a significant comparison of students' achievement that treated by using Concept Attainment and Treffinger. The procedures of applying Concept Attainment model and Treffinger model[19][20]:
Afterward, the post-test result was tested using Product-Moment to measure learning outcome for the cognitive domain. The data analysis technique administered was using Liliefors for normality test, Fisher for homogeneity test and t-test for the hypothetical test. Meanwhile, a scoring instrument for the affective domain used observation sheet.

3. Result And Discussion
The independent variable of this research was the Concept Attainment Model (experimental class 1, XI Science 5) Treffinger model (experimental class 2, XI Science 4) and the dependent variable was learning the outcome, where each class consisted of 36 students. After deciding the sample, the researcher administered a pre-test before any given treatment.

The objective of this research was to find out whether there was a comparison of learning outcomes when applying the Concept Attainment model and Treffinger model. To gain the data, the researcher employed a test and an observation. The test is a data collecting tool to measure the cognitive domain in learning outcomes [21].

On experimental class, where the Concept Attainment model was applied, students were encouraged to find new concepts independently hence cognitive and affective domain could be known. In the teaching-learning process, students were divided into groups and were given worksheets. This model suggested students be engaged actively in groups or individuals to deliver their ideas so the learning process became more meaningful.

In experimental class, where the Treffinger model was applied, this model proposed the cognitive and affective domain in the learning process. Treffinger model has conducted in three linked procedures namely creativity technique, giving the opportunity of the thinking process and implementing the competencies. During the learning process, students were divided into groups and were given worksheets. In applying the Treffinger model, it was added a trial to gain students' knowledge which could impact satisfying learning outcomes. Treffinger model at whole positively influence students' learning outcome, that thing can be seen on the average of pre-test and post-test which was higher than the Concept Attainment model.

Based on the average score analysis of pre-test dan post-test, showed that students’ learning outcome for Treffinger model was higher than Concept Attainment. It was due to the difficulty of
students to differentiate upon example and non-example of static fluids during applying Concept Attainment. In other words, the students treated by Treffinger model were easier to accept since they directly did practicing. It indicated that there was a significant comparison of the learning outcome by setting up both models. As stated in normality test, it can be seen that pre-test of experimental class 1 using Concept Attainment model gained $L_{\text{observed}} (0.146561) < L_{\text{critical}} (0.147667)$, meanwhile, the post-test measured was $L_{\text{observed}} (0.100038) < L_{\text{critical}} (0.147667)$, so in accordance to $L_{\text{observed}} < L_{\text{critical}}$ data distribution was normal. For the pre-test of experimental class 2 with the Treffinger model, it was obtained that $L_{\text{observed}} (0.118268) < L_{\text{critical}} (0.147667)$, however, the post-test gained was $L_{\text{observed}} (0.13401) < L_{\text{critical}} (0.147667)$, hence data distribution was normal. Furthermore, the homogeneity test result: pre-test result on learning physics using Concept Attainment model and Treffinger model with the significant of 0.05 was $F_{\text{observed}} (0.65) < F_{\text{critical}} (3.13)$, thus the data was homogenous. At the same time, the homogeneity test for the post-test on Treffinger class was $F_{\text{observed}} (1.58) < F_{\text{critical}} (3.13)$, thus data distribution was homogenous.

### Table 1. Hypothetical Test Result

| Class             | t-test result | Result                  | Conclusion     |
|-------------------|---------------|-------------------------|----------------|
| Concept Attainment| $t_{\text{observed}} = 3.536533544$ | $t_{\text{observed}} > t_{\text{critical}}$ | $H_1$ was accepted |
| Treffinger        | $t_{\text{critical}} = 1.667$          |                  |                |

T-test results presented that $t_{\text{observed}} (3.536533544) > t_{\text{critical}} (1.667)$. It can be categorized that $H_1$ was accepted as it was required to the criteria of independent t-Test if the $t_{\text{observed}} > t_{\text{critical}}$ it meant that there was a significant comparison.

![Figure 2. Value of Student Learning Outcomes](image)

Students' learning outcomes on the cognitive and affective domain can be seen from the result of the pre-test dan post-test. On the initial meeting, students were given pre-test about static fluids in which the instrument had been examined for the validity, reliability, item discrimination, item difficulty, distractor and then each class was treated differently consisting of XI IPA 5 (Concept Attainment model) and XI Science 4 (Treffinger model). In the last meeting, students had a post-test to measure students’ cognitive aspects. From the result above, the average score between the two classes was different: the pre-test for experimental class 1 was 43.61 and the post-test was 68.05. It implied that the class had an increase of 24.44 with N-gain average score of 0.37 (medium). In other word, the
average score of the experimental class; pre-test was 46.11 and the post-test was 81.66. It indicated that the class improved as much as 35.55 with N-gain average score of 0.58. Based on the observation result of applying Concept Attainment and Treffinger model, Students' affective value described in Table 2:

| Class             | Average of Percentage |
|-------------------|-----------------------|
| Concept Attainment| 82.87%                |
| Treffinger        | 84.90%                |

Students learning outcomes on the affective domain can be observed on the observation result. Referring to Table 2, the contradiction or comparison can be seen in the Treffinger class where students' curiosity was better rather than the one in the Concept Attainment class. Moreover, the average score of students' affective domain result was 82.87% for Concept Attainment class and was 84.90% for Treffinger class. The achievement results are encouraged by research conducted by Risdawati, Muh. Khalifah Mustami dan Hasanah that the concept attainment learning model can improve the learning outcomes of students and the research conducted by Benny Sofyan Samosir dan Andes Fuady can improve students understanding of the concept by using the Treffinger model.

As the description of the cognitive and affective domain score percentage, the Treffinger model always produced better results compared to the Concept Attainment model result. In this research, there were some issues concerning the research process: students had insufficient and low competence that caused it took a long time. That was the obstacle that the researcher faced: limited time available during the learning process.

4. Conclusion

From the result of the research conducted at the first semester of eleventh-grade science students of Al-Kautsar Senior High School Bandar Lampung (XI Science 5 as experimental class; treated by using Concept Attainment model and XI Science 4 as experimental class; treated by using Treffinger model) on static fluids material, it can be concluded that Treffinger model produced a higher result compared to Concept Attainment model showed by the result of cognitive and affective domain from N-gain and the percentage of observation for affective domain. For the cognitive domain, experimental class1 (Concept Attainment) N-gain value obtained was 0.37 at medium category and experimental class2 (Treffinger) N-gain value was 0.58 at medium category. Meanwhile, the affective domain result was 82.87% for Concept Attainment class and was 84.90% for the Treffinger class.

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