

Concept Attainment Model: A Pedagogical Approach to Strengthen Learning

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Abstract

The Concept Attainment Model (CAM) is an instructional strategy used to simplify conceptual clarity and understanding among students. This study focused on examining the effect of CAM on achievement of students in Physics subject. The sample constituted 120 students with 60 males and 60 females studying in Class VII. The students were randomly divided into two groups namely experimental group and control group with 60 students each. The students of experimental group were taught by CAM while the control group followed lecture method. At the completion of teaching learning process a self-made academic achievement test was administered to the students of both groups. The data were analyzed by using mean, standard deviation and independent t-test. The study concluded that the Concept Attainment Model was more effective in improving students' achievement than the lecture method.

Keywords: concept; attainment; pedagogy; physics; achievement.

Model Pencapaian Konsep: Sebuah Pendekatan Pedagogis untuk Memperkuat Pembelajaran

Abstrak

Concept Attainment Model (CAM) atau Model Pencapaian Konsep adalah strategi instruksional yang digunakan untuk menyederhanakan kejelasan konseptual dan pemahaman di antara para siswa. Penelitian ini berfokus untuk menguji pengaruh CAM terhadap prestasi siswa pada mata pelajaran Fisika. Sampel terdiri dari 120 siswa yang meliputi 60 laki-laki dan 60 perempuan yang duduk di Kelas VII. Siswa secara acak dibagi menjadi dua kelompok yaitu kelompok eksperimen dan kelompok kontrol yang masing-masing terdiri dari 60 siswa. Siswa di kelompok eksperimen diajar menggunakan CAM sementara kelompok kontrol mengikuti metode ceramah. Pada akhir proses belajar mengajar, tes prestasi akademik buatan sendiri diberikan kepada siswa dari kedua kelompok. Data dianalisis dengan menggunakan rata-rata, simpangan baku, dan uji-t independen. Studi ini menyimpulkan bahwa Concept Attainment Model lebih efektif dalam meningkatkan prestasi siswa dibandingkan dengan metode ceramah.

Keywords: konsep; pencapaian; pedagogi; fisika; prestasi.

Submitted: June 12, 2026

Received: June 25, 2026

Published: June 30, 2026

INTRODUCTION

Teaching and learning are two complementary sides of the instructional process. Learning begins in early childhood when a child opens their eyes and starts seeing the surrounding environment. Through interaction with the environment, learning naturally takes place. Learning is a continuous process of acquiring new knowledge through various experiences. The instructional process is considered more effective when it is systematically designed and properly implemented (Alam, 2017). Teaching is an art in which the teacher, as an artist, shapes learning by deciding what to teach, when to teach, and how to teach. Teaching methods serve as a bridge between teachers and students, enabling the effective

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achievement of instructional objectives when used appropriately. These teaching or instructional strategies should be continuously reviewed and revised to enhance the quality of teaching and learning. An effective teacher usually adopts diverse teaching strategies to impart content meaningfully and to address various learning needs. In this changing educational landscape, teachers are expected to adopt innovative teaching methods to meet the contemporary demands of students and ensure effective learning outcomes ([Patel, 2014](#)). The time has now arrived when greater emphasis needs to be placed on how to teach rather than merely on what to teach. In the modern era, the primary aim of education is to motivate students to learn actively by developing critical thinking, inquiry-based thinking, problem-solving abilities, observational skills, independent thinking and creativity. These essential qualities largely depend on the quality of teaching and the instructional strategies adopted by teachers.

Physics is a branch of science that deals with understanding of the universe and the scientific study of how it works. It includes the study of matter, energy, physical substances, electricity, heat, space, time and interactions. Due to its abstract and conceptual nature, students often consider physics to be a difficult subject.

Traditional methods of teaching, particularly the lecture method, tend to emphasize rote memorization, repletion of chalk and talk method, leading to passive learning, reduced interaction, declining student interest and ignore learners' diversity. To overcome these limitations, the adoption of innovative pedagogical models that foster interactive, learner-centered, and engaging learning experiences is essential.

Teaching models have great potential to enhance teaching-learning process. Teaching models assist teachers in systematic framework, planning instructions and designing curriculum ([Mohanty & Barik, 2022](#)). A teaching model follows step-by-step procedure to achieve instructional outcomes. The teaching models have three main functions of instructional process.

- Designing and specifying instructional objectives.
- Developing and selecting instructional material.
- Specifying teaching-learning activities.

The concept attainment model belongs to family of information processing model. It was constructed in 1956 based on work of Jerome Bruner, Jacqueline Goodnow, and George Austin, and is usually known as Bruner's Concept Attainment Model.

It is an inquiry-based framework in which learner categorized main attribute of a concept by doing comparison of examples and non-examples ([Habib, 2019](#)). It makes students proficient in recognizing similarities and relationship among various components of the environment. It is suitable to introduce new concepts, foster inductive reasoning, improving logical, reflective and imaginative skills ([Angraini & Wahyuni, 2021](#); [Aspabo, 2025](#)).

REVIEW OF RELATED RESEARCH

Several researchers have examined the usefulness of the Concept Attainment Model (CAM) in relation to various subjects, grades, and age groups. In a study conducted by [Singh \(2011\)](#), CAM was found to be effective in developing reasoning abilities and improving science proficiency. Similarly, [Mukherjee \(2011\)](#) reported improvement in science subjects by teaching through this model. [Kumar & Mathur \(2013\)](#) also observed a remarkable difference in learning outcomes between students tutored using CAM and those instructed through traditional methods in understanding physics concepts, finding CAM to be more effective.

[Bhargava \(2016\)](#) also studied its impact on academic achievement in social science among 9th grade students and concluded its effectiveness over traditional classroom teaching. [Hoovinbhavi](#)

(2018); [Kaseke & Muola \(2019\)](#) found concept attainment model more effective in term of achievement in biology subject. [Ostad & Soleymannpour \(2014\)](#) further supported CAM's effectiveness concluding that it can enhance students' academic performance in classroom settings.

[Ozturk & Kaya \(2020\)](#) found CAM to be effective in improving both academic achievement and scientific observation skills. [Angraini & Wahyuni \(2021\)](#) revealed that CAM significantly improved students' mathematical critical thinking skills compared to conventional methods. [Asyari & Wikanta \(2022\)](#) also reported positive effects of CAM on students' analytical thinking skills and concept competency. In recent study ([Aspabo, 2025](#)) concluded students instructed through the CAM showed better performance compared to those taught using traditional methods. Also, it helped in improving higher-order thinking skills in mathematics among learners. Similarly, [Ifrianti et al., \(2019\)](#) concluded that CAM is very helpful in clearing the concepts of students. [Kaur & Kaur \(2024\)](#) combined the constructivist approach with CAM and found it more effective and useful than traditional teaching in enhancing concept acquisition among 9th-grade social science students. Supporting these findings, [Alam & Fatma \(2023\)](#) concluded that CAM enhances academic achievement, scientific skills, problem-solving, and environmental education across various educational contexts and age groups. However, [Wenno et al., \(2016\)](#) concluded better achievement by drill skill model in physics learning as compared to concept attainment model. Also, [Sreekumar \(2022\)](#), who reported effectiveness of concept attainment model in enhancing scientific attitude among students. The findings of [Myat \(2020\)](#) stated that the Concept Attainment Model (CAM) positively contributed to mathematics teaching.

Several studies in literature have examined comparisons between two teaching models. [Yuliati et al., \(2018\)](#) suggested that cognitive outcomes of learners is higher who taught through Concept Attainment Model than those who taught through Discovery Method. Correspondingly [Latchanna & Swarnalatha \(2016\)](#) concluded that both Information Technology Model and Concept Attainment Model were more effective than the traditional model of teaching specially in biological sciences. [Kaimal \(2020\)](#) reported significantly higher effect of CAM as compared to activity-oriented method. In a comparison between the Treffinger Model and the Concept Attainment Model (CAM), the Treffinger Model was found to be more effective ([Anggraini et al., 2020](#)).

OBJECTIVES

The present study is based on following objectives:

- To study the role of concept attainment model in improving students' academic performance in Physics.
- To study the role of concept attainment model in improving male students' performance in Physics.
- To study the role of concept attainment model in improving female students' achievement in Physics.
- To study the differences in achievement between male students and female students instructed using concept attainment model.
- To study the differences in achievement between male students and female students instructed using lecture method.

HYPOTHESES

The present research is based on following hypotheses:

- The Concept Attainment Model will have a significant role on students' performance in Physics.
- The Concept Attainment Model will have a significant role on the performance of male students in Physics.

- The Concept Attainment Model will have a significant role on the performance of female students in Physics.
- There will be no significant differences in performance between male students and female students instructed using concept attainment model.
- There will be no significant differences in performance between male students and female students instructed using lecture method.

METHODOLOGY

In this study, students of Class VII from two schools with approximately equal student populations were selected as the sample. From each school, students were first stratified based on gender, comprising 30 male and 30 female students, resulting in a total of 60 students from each school. Thus, a total sample of 120 students was randomly selected from both schools. These students were further divided into two groups: an experimental group and a control group. Each group consisted of 60 students, including 30 males and 30 females. The students in the experimental group were taught using the Concept Attainment Model (CAM), whereas the students in the control group were taught through the traditional lecture method on the topic Energy. After the completion of the instructional period, an achievement test was administered to both groups to assess learning outcomes.

TOOL USED

The tool used for data collection, namely the Physics Achievement Test, was constructed by the researcher following the principles of test development and standardization. The test consisted of 26 multiple-choice items, carries one mark for a correct response.

DATA ANALYSIS

The data were analyzed using descriptive statistics (mean and standard deviation) and an independent t-test.

Table 1. The Comparative Result of Performance of Students through CAM and Lecture Method

Groups	No of Students	Mean	SD	t-test (df=118)
Experimental Group (Concept Attainment Model)	60	23.47	1.48	19.38
Controlled Group (Lecture Method)	60	16.45	2.38	19.38

A perusal of table-1 shows that the experimental group obtained a mean score of 23.47 having a standard deviation of 1.48, whereas control group facilitated through the Lecture Method, obtained a mean score of 16.45 having standard deviation of 2.38. The calculated t-value (19.38, df = 118) is highly significant, indicating that instruction using Concept Attainment Model resulted in significantly higher achievement as compared to the Lecture Method.

Table 2. The Comparative Result of Performance of Male Students through CAM and Lecture Method

Groups	No of Students	Mean	SD	t-test (df=58)
Experimental Group (Concept Attainment Model)	30	23.73	1.46	14.05

Groups	No of Students	Mean	SD	t-test (df=58)
Controlled Group (Lecture Method)	30	16.17	2.56	14.05

A close look at Table-2 depicts the comparative performance of male students instructed through the CAM and the Lecture Method. The male students taught through CAM obtained a mean score of 23.73 having standard deviation of 1.46, whereas those taught through the Lecture Method achieved a mean score of 16.17 having a standard deviation of 2.56. The obtained t-value (14.05, df = 58) is highly significant. Thus, male students instructed using Concept Attainment Model resulted in significantly higher achievement as compared to the Lecture Method.

Table 3. The Comparative Result of Performance of Female Students Instructed Using Concept Attainment Model and Lecture Method

Groups	No of Students	Mean	SD	t-test (df=58)
Experimental Group (Concept Attainment Model)	30	23.20	1.47	13.39
Controlled Group (Lecture Method)	30	16.73	2.20	13.39

The table-3 indicates the comparative performance scores of female students instructed through the CAM and the Lecture Method. The female students taught through CAM obtained a mean score of 23.20 having standard deviation of 1.47, whereas those taught through the Lecture Method achieved a mean score of 16.73 with a standard deviation of 2.20. The obtained t-value (13.39, df = 58) is highly significant. Thus, female students instructed using Concept Attainment Model resulted in significantly higher achievement as compared to the Lecture Method.

Table 4. The Comparative Result of Performance of Male Students and Female Students through Concept Attainment Model

Gender	No of Students	Mean	SD	t-test (df=58)
Male Students	30	23.73	1.46	1.40 (N.S)
Female Students	30	23.2	1.47	1.40 (N.S)

N.S (Non Significant)

The table-4 shows the comparative performance scores of male and female students instructed through the Concept Attainment Model (CAM). The calculated t-value (1.40, df = 58) is not statistically significant, as it falls below the table value of 1.96 at 5% level of significance. Thus, it indicates that this model didn't result in significant difference in performance between female and male students.

Table 5. The Comparative Result of Performance of Male Students and Female Students through Lecture Method

Groups	No of Students	Mean	SD	t-test (df=58)
Male Students	30	16.17	2.56	0.91(N.S)
Female Students	30	16.73	2.19	0.91(N.S)

N.S. (Non Significant)

The table-5 indicates that male and female students instructed through the lecture method. The calculated t -value (0.91, $df = 58$) is statistically insignificant, as it is lower than the table value of 1.96 at 5% level of significance. Thus, it indicates that lecture method didn't result in significant difference in performance between male and female students.

FINDINGS

- The first hypothesis that the Concept Attainment Model will have a significant role in students' performance in Physics is fully accepted. It is concluded that effective of CAM is greater than lecture method.
- The second hypothesis that the Concept Attainment Model will have a significant role on male students' performance in Physics is fully accepted. Therefore, male students studied through CAM is outperformed those of control group.
- The third hypothesis that the Concept Attainment Model will have a significant role on the performance of female students in Physics is fully accepted. Therefore, performance of female students through CAM is higher in comparison to lecture method.
- The fourth null hypothesis that there will be no significant differences in performance between male students and female students instructed using concept attainment model is accepted. Therefore, gender wise differences were not found to be significant among students instructed through CAM.
- The fifth null hypothesis that there will be no significant differences in performance between male students and female students instructed using lecture method is accepted. Therefore, gender related differences were not found to be significant among students instructed through lecture method.

DISCUSSION

The findings of present research clearly indicate that the performance of students instructed through this model was markedly higher compared to students taught through the Lecture Method. This shows that CAM, as an inquiry-based approach, provides students with the opportunity to actively construct knowledge and develop a deeper conceptual understanding rather than relying on rote memorization.

The results are in alignment with earlier research studies by [Karmakar \(2026\)](#); [Honmane et al., \(2024\)](#); [Alam \(2023\)](#); [Noreen & Chaudhary \(2021\)](#); [Pandey & Mishra \(2018\)](#); [Kaur \(2017\)](#); [Laxmi & Goyal \(2017\)](#); [Kaur \(2014\)](#); [Kumar \(2014\)](#); [Das \(2013\)](#); [Kumar & Mathur \(2013\)](#); [Singh \(2011\)](#); [Mukherjee \(2011\)](#); [Sidhu & Singh \(2005\)](#) who similarly found effectiveness of this model over traditional teaching methods in improving students' performance. Also, the findings of the present study corroborate those of [Ohri \(2015\)](#); [Rathod \(2022\)](#); [Anupan & Chimmalee \(2022\)](#) who reported that students taught with CAM scored higher than that of students taught with traditional teaching. These consistencies provide strong support for the efficacy of CAM across diverse contexts and further verify its applicability in instructional practices in various subjects.

The result indicates no significant variation in performance between male students and female students instructed via concept attainment model were found. It highlights that this model is suitable for all learners. Similar results were reported by [Honmane et al., \(2024\)](#); [Alam & Fatma \(2023\)](#); [Ozturk & Kaya \(2020\)](#); [Alam \(2017\)](#); [Chakrabarti \(2011\)](#) who concluded that CAM promotes equal learning opportunities. Nevertheless, this finding is contrary to the findings of [Singh et. al., \(2018\)](#) who concluded higher achievement score among females in comparison to male. Also, [Karmakar et al., \(2021\)](#) concluded effectiveness of CAM was more effective compared to traditional teaching methods in

improving academic achievement of female's students. [Usman & Agashi \(2018\)](#) concluded contrasting findings, indicating that male students obtained higher scores than female students when taught through concept attainment model.

CONCLUSION

However, when the Lecture Method was employed, students irrespective of gender showed comparatively lower achievement, indicating the limited influence of traditional teaching methods. Concept Attainment Model provides meaningful opportunities to examine students' thinking process and motivate effective concept formation. The study highlights that CAM is a vital pedagogical strategy in facilitating thinking abilities in Physics. Therefore, the science faculty should be adequately trained and skilled to use efficiently CAM in teaching science subjects.

Acknowledgment

The author would like to express sincere appreciation to the students who participated in this study and to the institutions that facilitated the implementation of the research. Their participation and cooperation contributed to the successful completion of this study.

Conflict of Interest Statement

The author declares that there is no conflict of interest regarding the research, authorship, and/or publication of this article.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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