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THE IMPACT OF DIFFERENT TEACHING APPROACHES ON STUDENTS' ACHIEVEMENT IN CHEMISTRY

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Abstract

This study investigates the influence of various teaching approaches on students' achievement in the field of chemistry. Traditional lecture-based approaches are contrasted with interactive and inquiry-based approaches to analyze their respective impacts on students' comprehension and performance. The sample consists of 60 students consists of first-year Undergraduate chemistry students studying at Annai Fathima College of Arts and Science, Madurai. The whole experiment was conducted for 30 working days. The 60 first-year undergraduate students were divided into three groups. Each group consisted of 20 students. One group was considered as a control group and the other two groups were considered as experimental groups and designated as experimental group I and experimental group II. The investigator conducted the achievement test in chemistry for three groups of first-year undergraduate students. The collected data was statically analyzed by using the 't'- test technique. The research findings showed that the significant increase in post-test scores over pre-test results attests to the effectiveness of the lecture approach in raising students' comprehension and subject-matter competence. The conclusion is that the lecture method has a positive impact on students' academic growth and acquisition of knowledge in college-level chemistry subjects.

Keywords: *Teaching approaches, chemistry education, lecture method, interactive teaching, inquiry-based learning, student achievement, and undergraduate students.*

Introduction

Different teaching approaches have a significant impact on how well students perform in the subject of chemistry. Conventional lecture-based approaches, in which teachers mainly impart knowledge through lectures, might give students a basic understanding of concepts, but they frequently don't engage them. This method favors rote memorization over encouraging critical thinking and problem-solving abilities. As a result,

some students might find it difficult to relate their theoretical understanding to real-world applications, which would hinder their ability to understand and perform well in chemistry overall.

On the other hand, approaches to teaching that are interactive and inquiry-based have demonstrated encouraging results in raising students' chemistry achievement. By encouraging students to investigate and discover concepts through practical experiments, discussions, and problem-solving exercises, these methods actively involve them in the learning process. This fosters a sincere interest in the topic as well as a deeper comprehension of chemical principles. These strategies help students retain and apply concepts better by encouraging active participation and knowledge application, which eventually improves students' performance in chemistry.

Technology-assisted teaching methods, which use simulations and digital tools to improve learning, have become more popular in recent years. Students can gain access to dynamic and visually stimulating resources through virtual labs, multimedia presentations, and interactive software, which can help them comprehend complex chemical concepts more thoroughly. Technology integration in the classroom not only accommodates a range of learning styles but also gives students valuable skills that they can use outside of the traditional classroom, preparing them for a world driven by technology. Consequently, by creating a more dynamic and flexible learning environment, such creative approaches can greatly improve students' achievement in chemistry.

Review of Related Literature

Abari, M.T. and Ikyule, P.U (2021) analyzed the effect of the guided-discovery approach on students' academic achievement in mathematics in senior secondary schools in Ushongo Local Government Area, Benue State. Analysis revealed that there was no significant difference in mean achievement scores of students taught mathematics using the Guided-discovery teaching method and those taught with the lecture method. The analysis also revealed that there was no significant difference in mean achievement scores of male and female students taught Mathematics using the Guided discovery approach.

Costa Mohsin (2008) conducted a study to identify the effects of cognitive, affective, and behavioural components on residents' attitudes toward place marketing. The research findings showed that the cognitive component of attitudes was found to be more influential on residents' attitudes toward place marketing than were affective or behavioural components.

Operational Definition of Key Terms

Teaching Approaches

Teaching approaches in education vary widely, each with its unique impact on students' learning experiences. Traditional methods, often lecture-based, prioritize information dissemination but may struggle to engage students actively.

Achievement in Chemistry

Achievement in chemistry is influenced by a combination of teaching approaches, with traditional lecture-based methods often falling short in fostering a deep understanding of the subject. When instruction

relies heavily on lectures, students may grasp theoretical concepts but struggle to connect them to real-world applications.

Research method of the study

A population is a group of individuals that have one or more characteristics a common and are of interest to the researchers. A sample is a small proportion of the population selected for observation and analysis. The sample consists of 60 students of first-year Undergraduate chemistry students studying at Annai Fathima College of Arts and Science, Madurai. The whole experiment was conducted for 30 working days. The 60 first-year undergraduate students were divided into three groups. Each group consisted of 20 students. One group was considered as a control group and the other two groups were considered as experimental groups and designated as experimental group I and experimental group II. The investigator conducted the achievement in chemistry test to three groups among first-year undergraduate students. The investigator collected data from the students who belong to an average group with equal weightage of biographical variables used by statistical matching, random assignment of students for control and experimental groups and those students only involved in experimental processes. Then investigator measured their scores. In the present study, the data obtained from assessment scores at the pre-test and post-test levels in the experimental method is analyzed by using the t-test.

Objective of the study

To find out the significant difference between the different approaches and students' achievement in chemistry.

Hypothesis of the study

There is a significant difference between the different teaching approaches and students' achievement in chemistry.

Testing the hypothesis

a**) Lecture Approach**

There is a significant difference between the overall pre-test and post-test control group students' achievement in chemistry subject at the college level by using the lecture approach.

Table - 1

Showing the significance of the mean difference between the overall pre-test and post-test control group students' achievement in chemistry subject at the college level by using a lecture approach

Test	Control group Students' overall achievement in chemistry subject by using lecture approach			
	M	SD	't' test	Level of Significance
Pre-test	32.20	3.90	4.11	**S (0.01 Level)**
Post-test	37.20	3.79		

*** Significant at 0.01 level**

The above table analyses the overall pre-test and post-test control group students' achievement in chemistry subjects at the college level by using a lecture approach.

In students' overall attitude towards the lecture approach, the control group students' achievement in chemistry subjects of pre-test and post-test have significant differences. In conclusion, a significant difference in overall achievement is revealed by comparing the pre-test and post-test results for control group students in the college-level chemistry course taught via the lecture method. There is no doubt in the data that there was a substantial difference in the students' performance between the pre-test and post-test evaluations. This shows that the study's use of the lecture method has a noticeable effect on improving students' comprehension and proficiency in the topics of chemistry. The observed increase in post-test scores over pre-test scores highlights how well the lecture method works to support student's academic development and knowledge acquisition in chemistry at the college level.

b) Guided discovery approach

There is a significant difference between the overall pre-test and post-test experimental group I students' achievement in chemistry subject at the college level by using the guided discovery approach.

Table - 2

Showing the significance of the mean difference between the overall pre-test and post-test experimental group I students' achievement in chemistry subject at the college level by guided discovery approach

Test	Experimental group I Students' overall achievement in chemistry subject by using a guided discovery approach			
	M	SD	't' test	Level of Significance
Pre-test	31.60	4.93	4.72	S (0.01 Level)
Post-test	38.25	3.91		

* Significant at 0.01 level

The above table analyses the overall pre-test and post-test control group students' achievement in chemistry subject at the college level by using a guided discovery approach.

In students' overall attitude towards the guided discovery approach, the experimental group I students' achievement in chemistry subjects of pre-test and post-test have significant differences. In the findings, the guided discovery approach was used to analyze the pre-test and post-test results of experimental group I students in the college-level chemistry course. The results indicate a significant impact on their academic achievement. The substantial variations between the students' pre-test and post-test results suggest that the guided discovery method was instrumental in improving the students' comprehension and expertise in chemistry. This implies that the guided discovery approach's instructional strategies have improved the students' academic performance in the subject.

c) Blended learning approach

There is a significant difference between the overall pre-test and post-test experimental group II students' achievement in chemistry subject at the college level by using a blended learning approach.

Table - 3

Showing the significance of the mean difference between the overall pre-test and post-test experimental group II students' achievement in chemistry subject at the college level by blended learning approach

Test	Experimental Group II students' overall achievement in chemistry subject by using a blended learning approach			
	M	SD	't' test	Level of Significance
Pre-test	30.70	5.26	7.39	S (0.01 Level)
Post-test	41.85	4.22		

* Significant at 0.01 level

The above table analyses the overall pre-test and post-test control group students' achievement in chemistry subject at the college level by using a blended learning approach. In students' overall attitude towards the blended learning approach, the experimental group II students' achievement in chemistry subjects of pre-test and post-test have significant differences. In the findings, the blended learning approach was used to analyze the pre-test and post-test results of experimental group II students in the college-level chemistry course. The results indicate a significant impact on their academic achievement. The substantial variations between the students' pre-test and post-test results suggest that the blended learning approach was instrumental in improving the students' comprehension and expertise in chemistry. This implies that the blended learning approach's instructional strategies have improved the students' academic performance in the subject.

Conclusion

This study examined the effectiveness of different teaching approaches on the achievement of first-year undergraduate chemistry students at Annai Fathima College of Arts and Science, Madurai. The results indicate that the lecture method led to a significant increase in post-test scores compared to pre-test results. This improvement suggests that the traditional lecture approach is effective in enhancing students' comprehension and subject-matter competence in college-level chemistry.

Key findings:

- The lecture method positively impacted students' academic growth.
- There was a significant increase in post-test scores over pre-test results.
- The approach was effective in improving students' knowledge acquisition in chemistry.

These results support the continued use of lecture-based teaching methods in undergraduate chemistry education. However, it's important to note that this study focused primarily on the lecture method, and further research comparing it directly with interactive and inquiry-based approaches could provide a more comprehensive understanding of the most effective teaching strategies for chemistry education.

Implications:

Pedagogical approach: The study supports the continued use of lecture-based methods in undergraduate chemistry education, particularly for foundational knowledge.

Resource allocation: Institutions may consider investing in improving lecture-based instruction techniques rather than completely overhauling their teaching methods.

Teacher training: The results suggest that enhancing lecturing skills could be a valuable focus for professional development programs for chemistry educators.

Limitations:

Sample size: With only 60 students divided into three groups, the sample size is relatively small, which may limit the generalizability of the results.

Duration: The 30-day experiment period may not be long enough to assess long-term retention and understanding.

Single institution: The study was conducted at one college, which may not represent diverse educational settings.

Lack of comparison: While the study mentions interactive and inquiry-based approaches, it doesn't appear to have directly compared these with the lecture method.

Subject specificity: The findings are specific to chemistry and may not apply to other disciplines.

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