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A Comparative Study of Science Achievement between students using the SCERT and the Oxford 'Connect with Science' Textbooks at Elementary Stage in Aizawl District

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Abstract

The study aimed to assess and compare the science achievement of elementary school students using the State Council of Educational Research and Training (SCERT) and Oxford 'Connect with Science' textbooks in Aizawl. A descriptive research design was adopted, with a sample of 200 students of Class VIII —100 students using the SCERT textbook and 100 using the Oxford textbook. Data were collected using a 40-item multiple-choice Science Achievement Tool developed by the investigators. Descriptive statistics (percentages, mean, standard deviation) were used to assess achievement levels, and an independent sample t-test was used to compare the mean scores of the two groups. Findings revealed that a significantly larger proportion of students using the Oxford 'Connect with Science' textbook (50%) achieved the 'Distinction' level compared to students using the SCERT textbooks (38%). The t-test result (t = 2.33) confirmed that the difference in mean achievement scores was statistically significant, leading to the rejection of the null hypothesis. The study concluded that textbook type is a significant factor influencing science achievement, with the Oxford textbook showing a more noticeable association with higher achievement.

Keywords: Science achievement, Elementary School Students, SCERT, Oxford, Descriptive research.

Introduction

The elementary education system in Mizoram has a rich history, starting with early smissionary efforts before it was taken over and run by the government. This system comprises of

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distinct levels: Primary Schools, which include the Foundational and Preparatory stages from Class I to IV, and Middle Schools, which cover Classes V to VII. A major change took place at the beginning of the 2011 academic year, when Class VIII moved from the secondary school level to the middle school level. This change effectively redefined elementary education to cover an eight-year span from Class I to VIII (Mizoram School Education Department, 2024).

According to current data from the UDISE+ 2024-25 NEP structure report, that there are 1,442 Primary Schools with 6,351 teachers serving a large student body of 157,532 learners. The Middle School level is even larger, with 1,556 schools and a strong teaching staff of 11,224 educators instructing 59,985 students (Ministry of Education, n.d.).

Textbooks are the most commonly used learning resources in school systems. They reflect curriculum goals, teaching methods, language choices and examples that influence what teachers instruct and what students learn. In many Indian states, including Mizoram, SCERT (State Council of Educational Research and Training)/adapted NCERT (National Council of Educational Research and Training) textbooks set the standard curriculum. Meanwhile, non-government and private boards like CISCE (Council for the Indian School Certificate Examinations) offer alternative curricular series that often focus on different teaching strategies and sequences.

A “good” textbook is usually assessed based on how well it matches curriculum goals, the correctness of its content, the clarity and flow of ideas, teaching methods like activity and inquiry-based learning, suitability for different cultures and languages, and how easy it is for teachers to use. The physical presence of textbooks is small compared to their theoretical influence. However, textbooks can guide nearly every decision a teacher makes while preparing for a day, a week, a month, or the year (Miller, 2015).

Empirical studies indicate that textbooks exert a direct influence on students’ achievement, motivation and engagement by shaping the cognitive demands placed upon them. Li and Wang (2024) found a significant correlation between students’ textbook use and their academic interest and attitudes toward learning science.

Textbooks play an important role in developing skills and encouraging inquiry-based learning. Choosing, designing and evaluating Science textbooks cautiously is essential for improving learning outcomes in elementary and middle schools. The National Education Policy 2020 calls for creating enjoyable materials in local languages and moving towards competency-based, hands-on learning. It also stresses the need for high-quality, bilingual Science textbooks. Additionally, the policy allows schools and teachers to select materials that combine national and local content, helping to meet the needs of diverse learners (Ministry of Education, 2020).

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Science education is vital at the elementary stage for developing curiosity, logical reasoning and problem-solving abilities in children. Early exposure to scientific thinking enables learners to connect classroom learning with everyday experiences, fostering creativity and critical inquiry (UNESCO, 2017). Hence, the quality and approach of Science textbooks greatly affect how students see and interact with Science. This made it important to compare them and assess achievements to improve Science education at elementary schools in Mizoram.

Rationale of the Study

Textbooks are a foundational element of classroom instruction, directly shaping the cognitive demands placed on students and influencing academic outcomes. A well-designed Science textbook that aligns with curricular competencies can significantly support inquiry, experimentation and the development of higher-order thinking skills, thereby improving motivation, engagement and overall achievement (Ministry of Education, 2020). Consequently, comparing the learning outcomes associated with different textbooks is essential for understanding their relative effectiveness and impact on student performance.

On the other hand, textbooks that focus heavily on rote memorization or lack relevant context can limit understanding and curiosity. Science is generally seen as a popular subject that encourages curiosity and problem-solving. However, research shows that limited time, inadequate resources and insufficient prioritization often restrict the depth of science instruction in many classrooms (Moran, 2022). To tackle these gaps, a comparative analysis of student achievement resulting from different textbooks can reveal the relative effectiveness of these core educational materials.

In Mizoram, examining this issue is particularly important for understanding how well elementary-level Science textbooks reflect the vision of “enjoyable and inspirational” learning set out in the National Education Policy 2020 (Ministry of Education, 2020). While some research has focused on students' interests, attitudes and motivation toward science, a direct comparison of achievement levels linked to specific textbook types is notably absent. This study fills that gap by providing an empirical basis for evaluating textbook effectiveness.

A rigorous comparison of the science achievement of elementary students in Aizawl using different textbooks is crucial, as it can definitively determine if differences in textbook design and pedagogical approach lead to significant variations in learning outcomes. This analysis will offer solid, data-driven evidence to inform textbook selection, curriculum development, and teacher support systems in the state.

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Literature Review

Young & Lee (2005), in their study "The Effects of a Kit-Based Science Curriculum and Intensive Science Professional Development on Elementary Student Science Achievement" in the United States, employed a comparative design. The science achievement of 226 fifth graders using a kit-based inquiry curriculum with professional development was compared to 173 fifth graders using non-kit materials without systematic PD. Findings revealed that students in kit-based classrooms scored significantly higher on science assessments than their non-kit counterparts, despite having fewer minutes of science instruction. However, no significant difference in achievement was found between kit-based students taught by teachers with high PD hours versus those with low PD hours.

Awasthi and Agarwal (2013) conducted a study titled “A Comparative Study of I.C.S.E., C.B.S.E. and U.P. Board Students regarding Comprehension of Environmental Issues” in Lucknow, India. The study compared the environmental concepts grasped by Class VIII students using a self-constructed "Environment Comprehension Test." Disproportionate stratified random sampling technique was employed to select a sample of 100 students from each board. The findings revealed that I.C.S.E. students (M=38.56) performed significantly better than C.B.S.E. students (M=36.76), who, in turn, outperformed U.P. Board students (M=24.33).

Agbaje and Awodun (2014) examined the “Impact of school location on academic achievement of science students in senior secondary school certificate examination” in Ekiti State, Nigeria. The study adopted an ex-post facto survey design, drawing a sample of 120 science students from six public secondary schools. Data were collected from WAEC computerized result sheets in Biology, Chemistry and Physics. Findings revealed no significant difference in achievement between rural and urban schools. Overall, urban schools outperformed their rural counterparts.

Cherthangpuii et al. (2023) in their study titled “Comparative Study of Class IX Science Textbook between NCERT and MBSE” conducted in Mizoram, employed a descriptive and analytical research design to evaluate and compare the NCERT and MBSE Class IX science textbooks. The textbooks themselves served as the main tools for analysis, focusing on parameters such as curriculum load, content organization, activities, pictorial representations, assessment items and other physical aspects. Findings revealed that MBSE’s science textbook was overloaded with exercises and curriculum content, which may burden both teachers and students.

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Pareek and Verma (2025) undertook a study titled “A Textbook Analysis of NCERT and SIERT Environmental Studies for Class Four Students” in Rajasthan. A qualitative textbook analysis method was employed, where the researchers compared NCERT and SIERT EVS textbooks for class IV. The study focused on the four main areas - content, sequence, standard and language. It was found that both textbooks provided systematic and logical organization of content, supported the development of scientific knowledge and avoided gender stereotyping. Differences emerged in medium of instruction (English for NCERT, Hindi for SIERT) and minor variations in content weightage.

Statement of the Problem

The study is entitled as, “A Comparative Study of Science Achievement between students using the SCERT and the Oxford 'Connect with Science' Textbooks at Elementary Stage in Aizawl District.”

Research Questions

1. What is the science achievement among elementary school students using the SCERT textbooks in Aizawl district?
2. What is the science achievement among elementary school students using the Oxford 'Connect with Science' textbooks in Aizawl district?
3. Is there a significant difference in science achievement between elementary school students using the SCERT textbooks and the Oxford 'Connect with Science' textbooks in Aizawl district?

Research Objectives

1. To assess science achievement of elementary school students using the SCERT textbooks in Aizawl district.
2. To evaluate science achievement of elementary school students using Oxford 'Connect with Science' textbooks in Aizawl district.
3. To compare science achievement between elementary school students using the SCERT textbooks and the Oxford ‘Connect with Science’ textbooks in Aizawl district.

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Research Hypothesis

1. There is no significant difference in science achievement between elementary school students using the SCERT textbooks and those using the Oxford 'Connect with Science' textbooks in Aizawl.

Research Design

The present study employed a descriptive research design to assess science achievement and determine differences in learning outcomes based on textbook type.

Population

The population of the study comprised all students studying at the elementary level in Aizawl district.

Sample

A simple random sampling method was employed to select schools using each textbook type. From these schools, 200 students of Class VIII were randomly selected - 100 students using the SCERT science textbooks and 100 students using the Oxford 'Connect with Science' textbooks. Data was collected from Class VIII students only as it represents the culmination of elementary education, where learning outcomes are most measurable.

Tool Used

The tool - "*Science Achievement Tool for Elementary School Students in Mizoram*" developed by the investigators to evaluate students' conceptual understanding and achievement in Science was used for the present study. It consisted of 40 multiple-choice objective-type items designed to assess knowledge, comprehension and application.

Scoring

The tool was designed to generate a total score ranging from 0 to 40. It comprises 40 multiple-choice items, each carrying one mark for a correct response with no marks allocated for incorrect or omitted answers. A higher score indicates greater level of achievement in science, while a lower score reflects limited achievement.

Data Analysis Technique

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Data analysis involved descriptive statistics like percentages, mean, and standard deviation, along with an inferential independent samples t-test to compare the mean scores of the two groups.

Analysis and Interpretation

1. Findings with regard to Objective No.1 - To assess science achievement of elementary school students using the SCERT textbooks in Aizawl district.

To determine the science achievement of elementary school students using the SCERT textbooks in Aizawl district, the test scores were categorized into five predefined levels.

The following table and figure present the overall distribution of these achievement levels among the participants.

Table-1

Science Achievement of Elementary School Students Using the SCERT Textbooks (N=100)

Score Range	Levels	Count	Percentages
30-40	Distinction	38	38%
24-29	First Division	42	42%
20-23	Second Division	14	14%
14-19	Third Division	6	6%
0-13	Fail	0	0%
Total		100	100.00%

Discussion

The findings indicated that the use of the SCERT textbook is associated with high science achievement at the elementary level in Aizawl. The complete absence of students in the lowest category and the strong concentration of students in the upper divisions suggest that the textbook's content, language and presentation are well-aligned with the learning objectives and are accessible to students. This high level of achievement could be attributed to the textbook's focus on the local context (Mizoram) or its alignment with the state-prescribed curriculum.

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2. Findings with regard to Objective No.2 - To evaluate science achievement of elementary school students using the Oxford 'Connect with Science' textbooks in Aizawl district.

To assess the science achievement of students using the Oxford textbook, their test scores were classified into the five predefined achievement levels.

The distribution of these levels among the Oxford textbook group is presented in Table 2 and Figure 2 below.

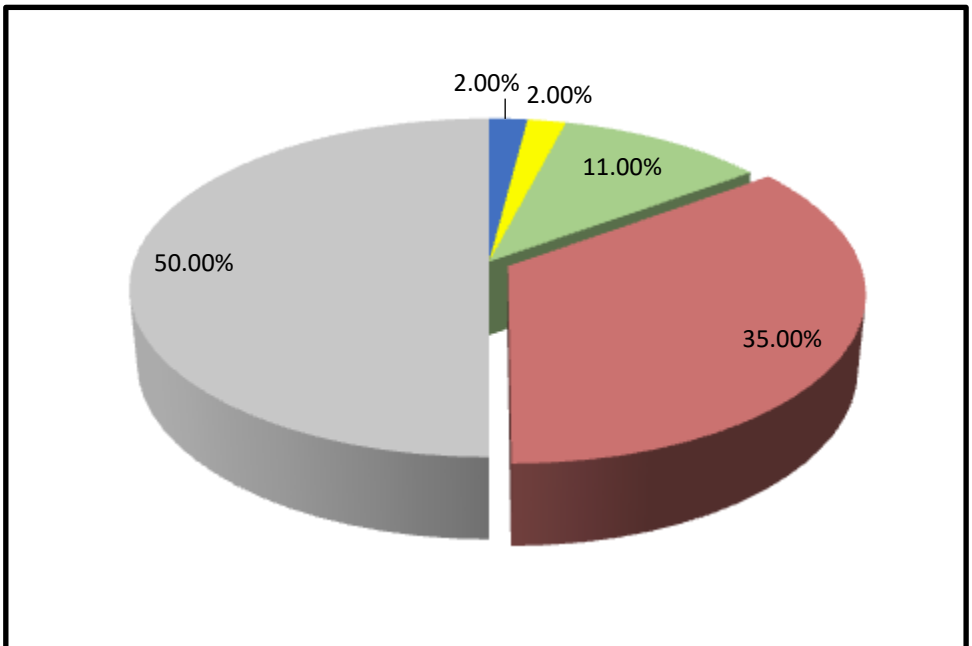
Table-2

Science Achievement Level of Elementary School Students Using Oxford Textbooks (N=100)

Score Range	Levels	Count	Percentages
30-40	Distinction	50	50%
24-29	First Division	35	35%
20-23	Second Division	11	11%
14-19	Third Division	2	2%
0-13	Fail	2	2%
	Total	100	100.00%

Figure-2

Pie chart illustrating the percentage distribution of science achievement among elementary school students using Oxford 'Connect with Science' textbooks



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A review of Table 2 and Figure 2 indicates a high concentration of students in the top achievement bands. The data shows that half (50%) of the students using the Oxford textbook attained a 'Distinction', while more than a third (35%) secured a 'First Division'. The remaining students were distributed across the lower divisions, with 11% in the 'Second Division', and a small minority of 2% in both the 'Third Division' and Fail' categories.

Discussion

The analysis demonstrated that the use of the Oxford 'Connect with Science' textbook is also linked to notably high science achievement. The fact that a commanding 85% of students achieved either a Distinction or First Division, with half the cohort reaching the highest tier, strongly suggests that the textbook effectively facilitates advanced learning outcomes. The very small proportion of students (4%) in the combined lowest categories indicates that the resource is successful for the vast majority. This high performance could be attributed to the textbook's modern pedagogical approach, and visually rich content that emphasize conceptual understanding.

3. Findings with regard to Objective No.3 - To compare science achievement between elementary school students using the SCERT textbooks and the Oxford 'Connect with Science' textbooks in Aizawl district.

The science achievement of Class VIII students using the SCERT textbook and those using the Oxford 'Connect with Science' was compared to examine whether the type of textbook had any significant influence on their achievement. The mean and standard deviation (SD) for both groups were computed, and an independent samples t-test was employed to determine whether the observed difference in mean scores was statistically significant.

Table 3 and Figure 3 below present the summary of this comparison.

Table-3

Comparison of science achievement of elementary school students using two different textbooks

Textbook	No.	Mean	SD	df	t-value	Inference

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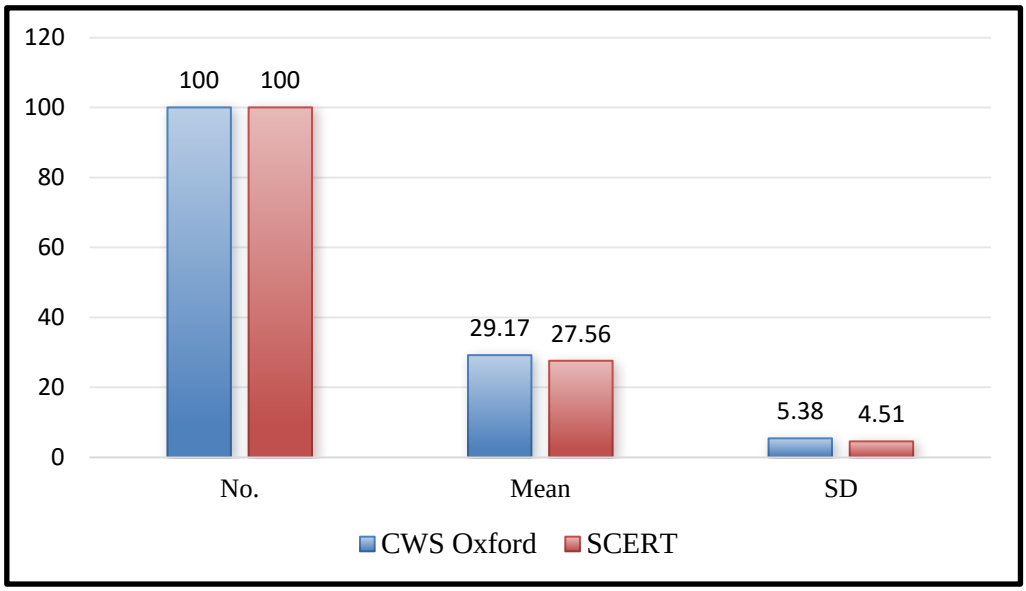
Oxford	100	29.17	5.38	198	2.33	Significant at 0.05
SCERT	100	27.56	4.51			

Figure 3

Bar graph showing Comparison of science achievement of elementary school students using two different textbooks



A perusal of the data presented in Table 3 and Figure 3 reveals that students using the Oxford 'Connect with Science' scored higher (M = 29.17, SD = 5.38) than those using the SCERT textbook (M = 27.56, SD = 4.51). The obtained t-value (t = 2.33, df = 198) was found to be significant at the 0.05 level, indicating that the difference in science achievement between the two groups is statistically significant.

Hence, the null hypothesis stating that "There is no significant difference in science achievement between elementary students using he SCERT textbooks and those using the Oxford 'Connect with Science' textbooks in Aizawl" is rejected.

Discussion

This finding indicated that the type of textbook used had a significant influence on students' science achievement in the present study. Students who used the Oxford 'Connect with Science' demonstrated higher mean achievement scores compared to those who used the SCERT Science textbook. This suggested that the Oxford textbook may provide richer conceptual explanations or better alignment with learners' cognitive levels, thereby enhancing comprehension and performance.

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The significant difference also implied that textbook quality and presentation can play a crucial role in supporting learning outcomes. While both textbooks were designed to meet curriculum standards, the supplementary content, illustrations and inquiry-based approach often found in private publications like Oxford may have contributed to better student engagement and understanding.

Conclusion

The study demonstrated that while both the SCERT and the Oxford 'Connect with Science' textbooks were associated with high science achievement, the choice of textbook has a statistically significant impact on student outcomes. Students using the Oxford 'Connect with Science' textbook not only achieved a higher mean score but were also substantially more likely to reach the top 'Distinction' level (50%) compared to those using the SCERT textbook (38%). This finding directly challenges the notion that textbooks are a neutral variable and confirms that their pedagogical design is a decisive factor in learning efficacy.

The superior performance linked to the Oxford 'Connect with Science' textbook suggested that its modern, inquiry-based approach and emphasis on conceptual understanding provide a distinct advantage in fostering higher-order scientific skills. This validates the trend of schools seeking out such materials to meet higher academic standards. Therefore, the study concluded that the quality, structure and pedagogical approach of a textbook are critical components that significantly influence science achievement at the elementary level.

Suggestions

1. Revision and Enhancement of the SCERT Science Textbook: The Mizoram SCERT should undertake a strategic revision of its science textbook. While preserving its local contextual strength, the revision must prioritize integrating the elements that made the Oxford 'Connect with Science' textbook effective: more inquiry-based activities and visual aids to explain complex concepts, that develop critical thinking and application skills.
2. Teacher Professional Development on Diverse Pedagogies: To maximize the benefits of any textbook, especially those with an enriched design, intensive teacher training programs should be implemented. These programs should equip teachers with the skills to effectively facilitate inquiry-based learning and utilize textbooks as a dynamic resource for fostering conceptual understanding, rather than merely following them as a static syllabus.

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3. Establish a State-Level Textbook Review and Adoption Framework: The State Education Department should create a formal mechanism for the regular review and approval of textbooks. This framework would allow schools to choose from a panel of quality-assured textbooks (including an enhanced SCERT version and selected private publications) that meet and exceed state learning outcomes, thereby fostering healthy competition and giving schools the autonomy to select the most effective resources for their students.

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