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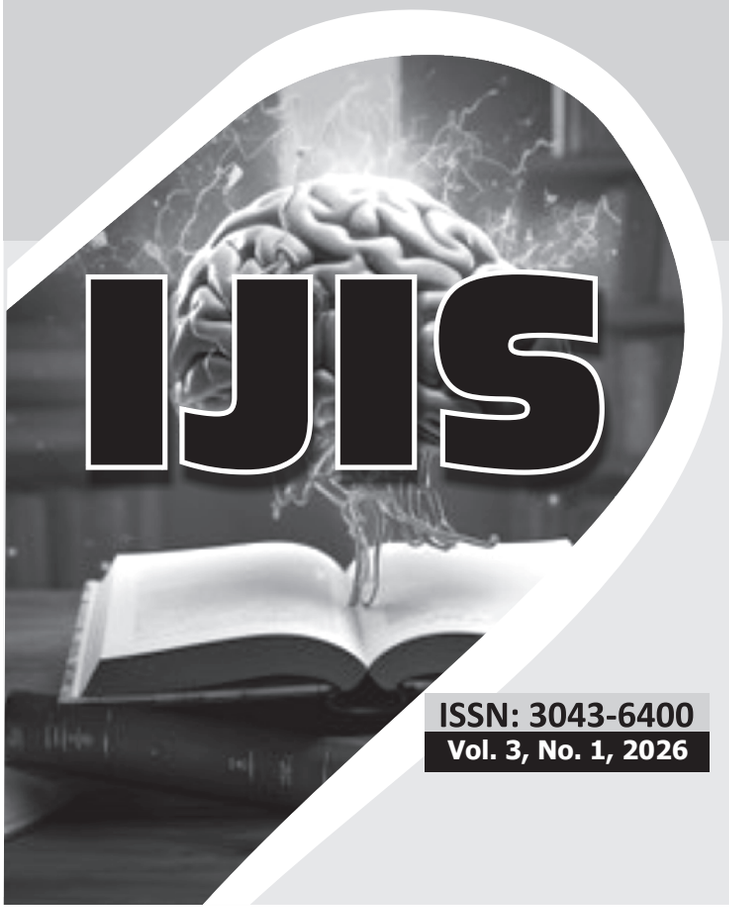

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INFLUENCE OF TEACHERS' QUALIFICATION AND SUBJECT MASTERY ON BASIC SCIENCE STUDENTS ACHIEVEMENT IN BASIC EDUCATION CERTIFICATE EXAMINATION (BECE) IN ABUJA MUNICIPAL AREA COUNCIL, ABUJA, NIGERIA

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Abstract
The study investigated the influence of teachers' qualification and subject mastery on Basic Science students' academic achievement in the Basic Education Certificate Examination (BECE) in Abuja Municipal Area Council. The study was guided by two research questions and two corresponding hypotheses, tested at a 0.05 level of significance. A descriptive survey research design was adopted for the study. The population comprised 48,921 students who sat for the BECE in the 2023 academic session and 219 Basic Science teachers in AMAC, FCT, Abuja. A simple random sampling technique was used to select 1,657 students and 54 Basic Science teachers who taught the selected students in the junior secondary school section under the Universal Basic Education (UBE) scheme. Data were collected using the Basic Science Teachers' Characteristics Checklist (BSTCC) and the Basic Science BECE Achievement Proforma. The reliability of the BSTCC was established using the Cronbach Alpha formula, yielding a reliability coefficient of 0.87. Descriptive statistics, including mean and standard deviation, were used to answer the research questions, while t-test and ANOVA were employed to test the hypotheses. The findings revealed that teachers'

academic qualification significantly influences students' academic achievement in Basic Science. Similarly, teachers' mastery of the subject matter was found to have a significant impact on students' achievement in the BECE. Based on the study's findings, it was recommended that teachers of Basic Science in AMAC should be encouraged to pursue in-service training and professional development programs. Such programs should emphasize both enhancing teachers' content knowledge and strengthening their pedagogical skills to improve students' learning outcomes and academic performance in Basic Science.

Keywords: Teachers' Qualification, Subject Mastery, Basic Science, Academic Achievement, and Basic Education Certificate Examination (BECE)

Introduction

Developed nations have attained their high levels of civilization largely through deliberate scientific education of their citizens, highlighting the central role of science and technology in national development (Ayibatonye & Ikechi, 2018). Recognizing this, Nigeria incorporates science subjects such as Basic Science in its Upper Basic schools to lay a foundation for future technological and scientific advancements. Science, defined as the systematic study of the physical world through observation, measurement, experimentation, and theory development, is crucial for national progress (Ayibatonye & Balafama, 2017). Nigeria aspires to become one of the world's most scientifically and technologically advanced nations, an ambition driven by the potential of science and technology to contribute to human development and socio-economic progress (Enemarie, 2016). Achieving this requires establishing a strong foundation in scientific education from an early age, as career interests and skills begin to form during childhood.

Basic Science is introduced at the primary level and reinforced at the upper basic education level to provide students with the necessary knowledge and skills to study advanced science subjects like Biology in senior secondary schools. The subject integrates fundamental scientific principles, ensuring students develop a coherent

understanding of scientific thought and inquiry (Agbo-Egwu, Adadu, Nwokolo-Ojo, & Enaboifo, 2017). By teaching Basic Science early, students gain foundational knowledge of natural phenomena and innovations in their environment, aligning with the objectives of upper basic science education, which aim to produce individuals capable of contributing meaningfully to national development in a modern scientific and technological context (NERDC, 2018; FRN, 2020). Mastery of Basic Science concepts, principles, theories, and laws equips students to navigate more complex topics in senior secondary school science courses (Ekundayo, 2016).

Effective teaching of Basic Science is essential for achieving technological breakthroughs in Nigeria and requires robust instructional strategies, including differentiated instruction, personalized learning, and collaborative approaches (Rouhani, 2017). Engaging students in practical scientific activities not only promotes understanding but also cultivates curiosity, problem-solving skills, and scientific attitudes (Jirgba, 2018). In line with the Federal Republic of Nigerias' National Policy on Education (FRN, 2020), science and technology education is prioritized as a foundation for socio-economic advancement and integration into the global scientific community. Early exposure to science is critical to prevent societal stagnation and ensure competitiveness in a rapidly evolving technological world (Ogunjobi, 2016).

To reinforce its importance, Basic Science has been made a compulsory subject at the basic education level in Nigeria. The curriculum is carefully structured to avoid content duplication while fostering curiosity, scientific thinking, and process skills such as observation, information organization, generalization, prediction, and experimental design (FRN, 2020; Agbo-Egwu *et al.,* 2017). By integrating multiple science disciplines rather than treating them as separate subjects, the curriculum provides students with a holistic understanding of science, reduces fear and anxiety associated with the subject, and places students at the center of the learning process. This interdisciplinary approach equips learners with essential skills for future scientific inquiry and technological competence.

Despite these efforts, challenges persist in effectively teaching Basic Science, affecting the country's goal of developing a scientifically literate population. Reports from the Education Resource Centre in Abuja indicate a consistent trend of low student achievement in the Basic Education Certificate Examination (BECE) from the year 2018 to 2024. This underperformance highlights gaps in instructional quality, teacher preparedness, and resource availability, underscoring the need for targeted interventions to improve teaching and learning outcomes in Basic Science. Addressing these challenges is crucial to ensuring that Nigeria develops a generation of scientifically competent individuals capable of driving technological innovation and national development.

Table 1: Statistics of Basic Science Students' Academic Achievement in Basic Education Certificate Examination (BECE) (2018-2023) in Abuja, Nigeria

Year	Number of Students registered	Number of Students who sat for the examination	Number of Students with Distinction (%)	Number of Students with Credit (%)	Number of Students with Pass (%)	Number of Students with Failure
2019	44213	44038	1518 (3.44%)	12143 (27.56%)	22882 (51.96%)	7495 (17.01%)
2020	46068	45144	2804 (6.21%)	16169 (35.82%)	21205 (46.97%)	4966 (11.00%)
2021	47113	41092	6051 (14.72%)	16718 (40.68%)	14699 (35.77%)	3624 (8.82%)
2022	48148	47988	7613 (15.86%)	20115 (41.92%)	16608 (34.61%)	3652 (7.61%)
2023	48086	48056	8955 (18.63%)	19436 (40.44%)	18336 (38.16%)	1329 (2.77%)
2024	49231	48921	4562 (9.33%)	18634 (38.09%)	20819 (42.56%)	4906 (10.03%)

Source: Department of Statistics, Education Resource Centre, Abuja (2024)

Table 1.1 indicates that the percentage of students achieving credit passes or higher in Basic Science has remained below 50% over the past seven years. While grades D7 and E8 are considered passing, they are insufficient for pursuing science-oriented subjects at the Senior Secondary School level. This persistent underachievement is influenced by a complex interplay of factors involving teachers,

students, and parents (Ezeoguine & Amaechi-Udogu, 2019). Among these, teacher quality is paramount, as student success largely depends on having qualified, knowledgeable, and dedicated educators (Adebayo & Sagaya, 2016). Amie-Ogan and Omunakwe (2020) emphasize that a teacher's mastery of content, understanding of students, and effective teaching methodologies significantly impact students' achievement, while Akinyi (2016) notes the importance of teachers' awareness of students' physical, intellectual, and psychological readiness.

Teacher qualification encompasses credentials, educational background, and professional training, which collectively influence classroom effectiveness. Effective teachers employ systematic methods, clear instructional goals, and advanced organizers to enhance learning outcomes (Fraser & Walberg, 2015). In this study, teacher-related factors include qualification, subject mastery, communication skills, and classroom management. The prevalence of unqualified or underqualified teachers in Nigerian schools, particularly in Basic Science, is a major contributor to low student achievement (Okah, 2016 & Ayibatonye, 2020). Teachers occupy a central role in the teaching-learning process, implementing curricula, guiding students toward learning objectives, and sustaining interest in subjects. Their influence is cumulative, with positive or negative effects on students' academic performance over time (Okah, 2016).

Competent teachers are critical to creating a learning environment that accommodates diverse students, ideas, and experiences, thereby enhancing achievement for learners of all levels (Bamidele & Adekola, 2017). Education quality improves directly with teacher competence, as trained teachers are better equipped to manage instructional processes, engage students effectively, and maximize learning outcomes (Wright & Horn, 2020). In Nigeria, teacher qualifications are categorized from the Nigeria Certificate in Education (NCE) to postgraduate and doctoral degrees, with higher qualifications linked to improved instructional quality and students' achievement (Bolarinwa & Kolawale, 2020). A teacher's qualifications, combined with affective traits such as attitude, self-efficacy, and experience, significantly influence students' learning

(Jakayinfa, Salami, Olu-Ajayi & Owonuwa, 2022).
Subject mastery further enhances students' achievement, as teachers with deep content knowledge can engage students effectively, construct understanding, pose meaningful questions, offer alternative explanations, and stimulate inquiry (Ezeudu & Utazi, 2018). Competent teachers understand central concepts, methodologies, and advanced content, which allows them to deliver high-quality instruction that directly impacts student achievement (Duru, Dominic, Udoha & Ochuba, 2020) (Ejovwoke & Itie, 2017). Subject mastery inspires both teachers and students, improves instructional quality, and ensures that knowledge is accurately transmitted, forming a solid foundation for national development (Ksenia, 2017). Modern educational standards demand that teachers possess substantial knowledge and skills in pedagogy and assessment to meet the quality expectations of contemporary schooling.

Academic achievement refers to the degree to which a student, teacher, or educational institution attains specific short-term or long-term learning objectives. Igboanugo and Egolum (2017) define academic achievement as the successful realization of educational goals, reflecting either the outcome of students' learning or the extent to which a teacher has fulfilled stated instructional objectives. The Chief Examiner's Report of the 2022 Basic Education Certificate Examination (BECE) indicated that students' performance in Basic Science showed only marginal improvement compared to the previous year, with achievement levels slightly above average.

Several factors have been identified as contributing to the suboptimal performance of Basic Science students. Enemarie (2016) notes that limited exposure to scientific experiments and practical activities, ineffective teaching methods, overcrowded classrooms, insufficient time allocation for lessons, inadequate student preparation, and difficulties in comprehending examination questions significantly hinder student achievement (Ekundayo, 2017). Addressing these challenges requires interventions that are compatible with the existing educational framework and capable of improving learning outcomes effectively. In light of these concerns, this study seeks to

examine the influence of teachers' qualifications and subject mastery on the academic achievement of Basic Science students in the BECE within Abuja Municipal Area Council, Abuja, Nigeria. The research aims to provide insights into how teacher-related factors affect students' performance and to identify strategies for enhancing achievement in Basic Science at the upper basic education level.

Statement of the Research Problem

Between the 2019 and 2024 academic sessions, students' performance in Basic Science in the Basic Education Certificate Examination (BECE) in Abuja Municipal Area Council, Abuja, Nigeria, has been consistently poor. This low achievement has also led to a decline in students' interest and enrollment in science-related subjects at both the junior and senior secondary school levels. Several factors may account for this situation, particularly those related to teachers' characteristics such as teachers' Qualification and subject mastery. Ineffectiveness in these areas often results in poor academic outcomes and reduced productivity. Consequently, the study seeks to determine the influence of teachers' characteristics on Basic Science students' achievement in BECE within Abuja Municipal Area Council.

Purpose of the Study

The purpose of this study was to investigate the influence of teachers' Qualification and subject mastery on Basic Science students' achievement in BECE in Abuja Municipal Area Council, Abuja, Nigeria. The specific objectives of this study were to:

i. examine the influence of teachers' Qualification on students' academic achievement in Basic Science.
ii. investigate the influence of teachers mastery on students' academic achievement in Basic Science.

Hypotheses

The following hypotheses were tested at 0.05 significant level:

H_o1**:** Teachers' qualification has no significant influence on students' academic achievement in Basic Science.

H_o2: Teachers' subject mastery has no significant influence on students' academic achievement in Basic Science.

Methodology

The study adopted descriptive survey design .The population of the study comprised 48,921 upper basics secondary students that enrolled and sat for the BECE examinations for 2024 session, 219 Basic Science teachers in the Junior section (UBE) of the public secondary schools in AMAC, FCT, Abuja. AMAC, FCT, Abuja has 175 public junior secondary schools. The sample for the study comprised of 1660 students who enrolled and sat for the BECE examinations for 2024 and 54 Basic science teachers who taught same students as sample for the study from junior secondary section (UBE). This was achieved using simple random sampling [SRS] technique ensures that every teacher and student in the target population has an equal chance of being selected. Since the study involves Basic science teachers and upper basic 3 students who have taken BECE. A list of all Basic Science students' in public schools within AMAC was obtained from the Educational Resource center in FCT Abuja and a list of upper basic 3 students' who completed BECE in Basic Science is gathered from the school's examination records. Once the population list was compiled, the SRS technique was used thus; Each school in AMAC was listed and cut out separately. Using lucky dip, names of schools within AMAC were packed in a box, mixed together and drawn randomly. The teachers corresponding to the chosen schools were included in the study. For students, the alms in which the teachers taught. The study used two research instruments for data collection, these are; Basic Science Teacher's Characteristics Checklist (BSTCC), The data collected is quantitative data [numerical data] 'This data is used to measure and analyze relationships statistically base on teachers' characteristics, which include; Teachers' qualification and teachers' subject mastery, Basic Science BECE Achievement proforma - Is the students' achievement data obtained from BECE 2024 scores in Basic science numerical achievement data obtained from schools' records. Basic Science Teacher's Characteristics Checklist (BSTCC): is a 20 itemed observation checklist developed to elicit information from the teachers on their qualification, knowledge content, communication ability, and classroom management skills in Basic Science. BSTCC was self-developed by the researcher and comprised twenty (20) items eliciting information on teachers' factor. The instrument had

two columns, the first had five level of qualifications while the other had fifteen questionnaires' items, making observable twenty items base on the objectives of the study. The response scale was structure on high and low achievement. Basic science students' achievement proforma, It consists of data drawn from BECE achievement 2024 session.

To ensure face and content validity of the instrument for this study, the researcher issued out the instruments to lecturers, two from Department of Science, Technology and Mathematics Education and one from Measurement and Evaluation all in Nasarawa State University, Keffi. They were given the instrument to assess its clarity and relevance and also to ascertain their construct and face validity. Corrections and modifications made were incorporated into the final copies of the questionnaire and Basic Science BECE Achievement proforma. The average validity index obtained was 0.83.The instruments were trial tested on thirty (30) upper basic 3 students in a secondary school in Nasarawa State. This school is part of the target population but not part of the sample. The internal consistency of the reliability estimate of the Basic Science BECE Achievement proforma was determined using the split half method. The scores of the students were split into two halves using the odd and even numbers. The reliability estimate for Basic Science Teachers' Characteristics Checklist (BSTCC) was determined using the Cronbach Alpha formula and the reliability coefficient obtained was 0.87. Data collected were analyzed using descriptive statistics of mean and standard deviation to answer the research questions. The null hypotheses were tested using ANOVA to test hypotheses one and t-test to test for hypotheses two to four at significance level of 0.05. SPSS package was employed for data analysis to obtain p-value.

Results

Research Question One

What is the influence of teachers' qualification on students' academic achievement in Basic Science?

The data to answer this question is presented in Table 4.1.

Table 2: Mean and Standard Deviation on Teachers' Qualification on Students' Academic Achievement in Basic Science

Teachers' Qualification	Mean	Std. Deviation	N
NCE	54.21	5.093	435
B. Sc.(Ed)	55.73	5.170	986
M. Ed	58.90	5.531	239

Table 2 shows the means and standard deviations of teachers' qualification on students' academic achievement in Basic Science. Students (N=435) taught under the NCE teachers have a mean score of 54.21 with a standard deviation of 5.09; students (N=986) taught under the B. Sc. (Ed) teachers have a mean score of 55.73 with a standard deviation of 5.17 and the students (N=239) taught under the M. Ed teachers have a mean score of 58.90 with a standard deviation of 5.53

Hypothesis One

H_o1: Teachers' qualification has no significant influence on students' academic achievement in Basic Science.

The results of this hypothesis are presented in Table 2.

Table 3: (ANOVA) Result of Teachers' Qualification on Students' Academic Achievement in Basic Science

Source	Type III Sum of Squares		Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3404.840[a]	2	1702.420	62.877	.000	.071
Intercept	3802176.838	1	3802176.838	140430.047	.000	.988
Teachers'	3404.840	2	1702.420	62.877	.000	.071
Qualification	44863.668	1657	27.075			
Error	5214456.000	1660				
Total	48268.508	1659				
Corrected Total						

a. R Squared = .071 (Adjusted R Squared = .069)

Table 3 shows the ANOVA result of teachers' qualification and students' achievement in Basic Science. $F = 62.877$; $p = 0.000 < \alpha = 0.05$. Therefore, the null hypothesis was rejected. This implies that teachers' qualification has significant influence on students' academic achievement in Basic Science.

Based on the analysis, a Bonferroni multiple comparisons was used to determine the direction of difference in the Teachers' qualification as presented in Table 4.3

Table 4: Bonferroni Multiple Comparison on Teachers' Qualification and Students Achievement in Basic Science

(I) Teachers' Qualification	(J) Teachers' Qualification	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
NCE	B Sc Ed	-1.52*	.300	.000	-2.24	-.80
	M Ed	-4.69*	.419	.000	-5.70	-3.69
B Sc Ed	NCE	1.52*	.300	.000	.80	2.24
	M Ed	-3.17*	.375	.000	-4.07	-2.27
M Ed	NCE	4.69*	.419	.000	3.69	5.70
	B Sc Ed	3.17*	.375	.000	2.27	4.07

Based on observed means.
The error term is Mean Square (Error) = 27.075.
*The mean difference is significant at the .05 level.

Table 4 reveals the Bonferroni Multiple Comparison on Teachers' Qualification and Students Achievement in Basic Science. NCE qualification compared with B. Sc. (Ed) yielded a mean difference of -1.52; $p = 0.000 < \alpha = 0.05$ and NCE qualification compared with M. Ed yielded a mean difference of -4.69; $p = 0.000 < \alpha = 0.05$. B. Sc. (Ed) compared with NCE yielded a mean difference of 1.52; $p = 0.000 < \alpha = 0.05$ and B. Sc. (Ed) compared with M. Ed yielded a mean difference of -3.17; $p = 0.000 < \alpha = 0.05$. M. Ed compared with NCE revealed a mean difference of 4.69; $p = 0.000 < \alpha = 0.05$ and M. Ed compared with B.Sc. (Ed) revealed a mean difference of 3.17; $p = 0.000 < \alpha = 0.05$. Since no significance difference is observed, the hypothesis was rejected.

Research Question Two
What is the influence of teachers' subject mastery on students' academic achievement in Basic Science?

The scores to answer this question is presented in Table 4.4.

Table 5: Mean and Standard Deviation on Teacher's Knowledge of Subject Matter and Students' Achievement in Basic Science

	Teachers	N	Mean	Std. Deviation	Std. Error Mean
Achievement	High Mastery	670	54.92	5.234	.202
	Low Mastery	990	53.34	4.631	.147

Table 5 reveals the mean and standard deviation of teacher's knowledge of subject matter students' achievement in Basic Science. Students (N= 670) under teachers with high knowledge of subject matter have a mean achievement score of 54.92 with a standard deviation of 5.23, while those (N=990) under teachers with low knowledge of subject matter have a mean achievement score of 53.34 with a standard deviation of 4.63.

Hypothesis Two
H_o2: Teachers' subject mastery has no significant influence on students' academic achievement in Basic Science.

The result of this hypothesis is presented in Table 4.5.

Table 6: (t-test) Result of Teachers' Knowledge of Subject Matter and Students' Achievement in Basic Science

	Teachers	N	Mean	Std. Deviation	t-test for Equality of Means		
					t	df	Sig. (2-tailed)
Achievement	High Mastery	670	54.92	5.234	6.480	1658	0.000
	Low Mastery	990	53.34	4.631			

Table 6 shows the t-test result of teachers' knowledge of subject matter and students' achievement in Basic Science. $t = 6.480$; $df = 1658$; $p = 0.000 < \alpha = 0.05$. Therefore, the null hypothesis was

rejected. This implies that teachers' knowledge of subject matter has significant influence on students' achievement in Basic Science.

Discussion of Findings

Findings from this study revealed that teachers' qualification has significant influence on students' academic achievement in Basic Science. This finding is in agreement with the findings of Ekperi (2018); Ayibatonye (2020); Amie-Ogan and Omunakwe (2020); Uzowulu and Egolun (2022); Jekayinfa, Salami, Olu-Ajayi and Owunuwa (2022) who found out that teachers' qualification significantly influences students' academic achievement. The finding supports teachers' qualifications with significant influence on students' academic achievement in Basic Science. This suggests that possessing advanced degrees or certifications inherently improve teacher's effectiveness in the classroom.

Also, the findings revealed that teachers' knowledge of subject matter has significant influence on students' achievement in Basic Science. This is in agreement with the findings of Ekperi (2018); Duru, Dominic, Udoha and Ochuba (2020); Amie-Ogan and Omunakwe (2020) who found out that teachers' knowledge of subject matter enhance students' achievement in Basic Science. The finding that teachers' knowledge of subject matter significantly influences students' achievement, given the assumption that a deep understanding of the subject is crucial for effective teaching. This suggests that while subject knowledge is important, it may be the sole or even primary factor in student success. Effective teaching also relies heavily on pedagogical skills, such as the ability to explain concepts clearly, use appropriate teaching methods, and engage students actively in learning. Teachers with strong subject knowledge but weak pedagogical skills may struggle to convey complex ideas effectively. Other factors such as students' prior knowledge, study habits, and access to supplementary resources might play a more significant role in their academic achievement.

Conclusion

The study concludes that teachers' qualification and subject mastery significantly influence students' achievement in Basic Science in the

Basic Education Certificate Examination (BECE) in Abuja Municipal Area Council, Abuja, Nigeria. Students taught by highly qualified teachers with strong subject mastery demonstrated superior performance compared to those taught by less qualified counterparts. This underscores the critical role of teacher quality in shaping students' academic outcomes and highlights the need for continuous professional development to enhance teachers' competence and subject expertise for improved achievement in Basic Science.

Recommendations

Based on the findings of this study, it was recommended that;

- Government and educational authorities should encourage and support Basic Science teachers to upgrade their academic qualifications through sponsorships, scholarships, and professional development programs. This will improve their pedagogical competence and instructional delivery.
- Regular workshops, seminars, and refresher courses should be organized to strengthen teachers' mastery of Basic Science concepts and modern teaching methods. Emphasis should be placed on practical, inquiry-based approaches that promote students' understanding and achievement in the subject.

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