INFLUENCE OF CLASSROOM LEARNING ENVIRONMENT ON SECONDARY SCHOOL CHEMISTRY STUDENTS' ACHIEVEMENT IN EDO CENTRAL SENATORIAL DISTRICT IN EDO STATE

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Abstract

*This study examined the influence of classroom learning environment on chemistry students' academic achievement in secondary schools in Edo Central Senatorial District in Edo State. Two research questions and two hypotheses guided the study. The study adopts a survey research design and Expo Facto. The population consists of 2,500 secondary school students taking chemistry in Edo Central Senatorial District in Edo State. A total sample size of 300 SS11 Chemistry as selected, proportionally representing the various strata. The instruments for data collection were a structured questionnaire titled Influence of classroom learning environment on Chemistry Students' Academic Achievement Questionnaire. (*CLEQ*) and Chemistry Achievement Test (CAT). The instruments were validated by three experts. The Reliability was determined using a pilot study and data collected were analyzed Cronbach's alpha statistics for the questionnaire and Kuder- Richardson 21 formula for the CAT , with a reliability coefficients of 0.78 and 0.77 respectively obtained. The data collected were analyzed using frequency and percentage for research question one, mean, standard deviation for research question 2 and 3, and independent samples t-test to test hypothesis one. The findings of the study showed that: most schools have unconducive physical, social and psychological learning environments; the classroom learning environment significantly affects students' academic achievement in chemistry; and there is a significant difference in male and female chemistry students' achievement based on the classroom learning environment they are exposed to. The study recommends that classroom conditions should be enhanced by ensuring adequate lighting, proper ventilation, and comfortable seating arrangements; efforts should be made to foster a supportive and inclusive classroom culture that encourages interaction and collaboration among students.*

Keywords: Classroom Learning Environment; Chemistry; Academic Achievement; Secondary Schools

Introduction

While mastering chemistry requires a solid understanding of concepts, the classroom environment in which students learn is just as critical to their 35success. Factors such as physical space, social dynamics and emotional support can influence how students engage with the material, affecting both their learning process and academic achievement. (Rusticus et al, 2023). A learning environment encompasses more than the physical learning facilities but all the factors within that environment that play a role in the delivery of instruction and the support of student learning. (Katherine & Frank, 2023).learning environment therefore includes the physical infrastructure, psychological and social atmosphere of the environment affecting the learning of students. Chemistry, a fundamental branch of science involves the study of matter, its properties and how it interacts and changes. In the chemistry curriculum, secondary school students are required to understand abstract concepts, solve complex problems and conduct experiments. These demands can be particularly challenging if the learning environment is unsupportive and inadequately equipped.

A key aspect of the learning environment is the physical space in which students learn. This environment encompasses all physical factors that contribute to the space where learning takes place. It includes elements such as classroom arrangement, furniture layout, material and resource availability (e.g., books, computers); and environmental factors such as levels of light, ventilation, and noise control. A well-designed physical learning environment plays a crucial role in enhancing students' academic achievement (Owoseni et al, 2020), particularly in subjects like chemistry. The physical aspect of the learning space, including the design of the laboratory and classroom, can significantly impact students' ability to engage with the content impact and perform well in both theoretical and practical aspects of chemistry.

The social learning environment refers to a setting where learners engage with one another through collaborative activities, discussions and group work, fostering learning through social interaction. This environment emphasizes the importance of peer-to-peer interaction, helping learners develop critical thinking skills social interaction and improve retention of information by actively participating in shared learning experiences. (Yogeesha & Rajajinagar, 2016). The social learning environment plays a key role in fostering interactions that influence students' achievement. Such an environment is a collaborative and interactive

atmosphere where individuals learn from others through watching, copying and exchanging experiences. The exchange of ideas between the teacher and students in the classroom focus on getting learners to think for themselves, independently of the text. This implies that chemistry teachers must model their instructions to enforce collaboration with students since cooperative learning occurs in groups that share a common purpose and task, it, again, implies that the chemistry teacher must broaden interactions to fit the zone of maximum response opportunity that is common to most group members in the classroom. (Ajaja & Eravwoke, 2010).

Conducive social learning environments for chemistry teaching and learning encourage students to query, collaborate in teams, and grapple with chemistry concepts without fear of making mistakes (Aina & Ajayi, 2022).Students are more likely to succeed in environments where they feel emotionally safe and nurtured by teachers as well as peers. A chemistry classroom environment, with supportive teacher-student relationships, peer collaboration, and communication, can make students become interested and motivated to actively engage in learning opportunities. Such learning settings, as cited by Aina & Ajayi (2022), promote deeper learning necessary for the successful acquisition of a subject like chemistry that must be studied with ongoing focus, critical thinking, and ongoing effort. When students study in groups in a structured learning setting, it builds their confidence and strengthens their understanding of challenging concepts. Peer-to-peer learning or group work in the chemistry laboratory can help grasp difficult concepts with the assistance of peers. On the other hand, classroom settings without such interactive dynamics might render students isolated, overburdened, or disconnected, which can ultimately lead to poorer academic performance (Adeoye, 2021). In general, a conducive social learning environment plays a crucial role in shaping students' attitude and values. It encourages the exploration of diverse view point and promotes the cultivation of critical thinking, reasoning and problem solving skills which collectively contribute to improved academic achievement.

The psychological learning environment refers to the emotional and cognitive atmosphere within the learning setting that prioritize constructing an emotionally secure environment where the students feel comfortable to express themselves and their ideas without fear of judgment. It enhances student engagement and participation by addressing both intrinsic and extrinsic

factors which contribute to improved academic achievement and learning outcomes. In addition, it seeks to establish a growth mind-set, a positive learning attitude and resilience which are extremely crucial in overcoming adversity. The psychological learning environment promotes differences among learners whereby every learner is able to develop as a result of their unique psychological needs. An environment where students are not supported, motivated, and encouraged to learn actively, their school performance declines. Students' curiosity and willingness to explore chemistry concepts in depth will be dampened in a learning environment that uses authoritarian teaching practices, no student collaboration, and little room for inquiry-based learning. This is detrimental to subjects like chemistry, where one has to master problem-solving, critical thinking, and the implementation of theoretical concepts to real problems.

In Nigeria, the fluctuating performance of students in chemistry particularly at secondary school levels has been a growing concern among teachers, policymakers, and parents (Olufemi & Onyekwere, 2023). Chemistry is a core science subject and plays a vital role in students who intend to work in medicine, engineering, and environmental science, and its understanding is a major determinant of future professional and academic success. Unfortunately, national examinations like West African Senior School Certificate Examination (WASSCE) results always have low chemistry pass rates, and this is a warning signal about the quality of learning and teaching environments across the country (WAEC'S Chief Examiners Report 2020-2022). Research has identified various causes of this fact, one of which is the learning environment in classrooms. The classroom learning environment must be organized and supportive to facilitate students' understanding of such complex topics as chemistry (Tadura, 2024. However, the majority of Nigerian secondary schools, especially those rural and underdeveloped schools, experience congested classrooms, a shortage of laboratory facilities, poor lighting, and inadequate ventilation. This diverts students' attention from focusing and also limits hands-on activities, which is vital for mastering chemistry principles. Such problems become barriers to quality learning, resulting in students' disengagement and ultimately poor academic performance. (Olufemi & Onyekwere, 2023). In Edo Central Senatorial District, the trend is consistent with the general national pattern. Underperformance in chemistry by students has been attributed

across the board to Non-conducive classroom environments, where schools often lack the physical, social and psychological environment to support science education (Ogunleye & Odeleye, 2020). Chemistry classes are taught in ordinary classrooms rather than fully-equipped labs, cutting short students' chances to do experiments or to engage in practice learning, the heart of understanding theoretical concepts. The absence of basic laboratory materials like test tubes, Bunsen burners, and reagents further complicates matters since teachers are forced to rely mainly on rote learning and theoretical explanation rather than active, experiment-based learning.

Furthermore, in the majority of schools in the district, high class sizes prevent teachers from providing individual attention or addressing students' unique struggles in understanding complex chemistry principles. This lack of one-on-one guidance can cause lagging students to fall behind even further, expanding the performance gap. Ogunleye and Odeleye (2020) reiterate that such a challenge is particularly identified in rural schools, where there is minimal funding and the few available classrooms are overcrowded, dilapidated, and inadequately equipped for effective teaching and learning. Despite the recognized potency of classroom conditions in student learning, the majority of schools in Edo Central Senatorial District continue to face severe challenges that adversely impact the academic achievement of students, particularly in subjects like chemistry. One of the principal issues is congested classrooms, where the student-to-teacher ratio is too high to enable quality learning and teaching. Under such conditions, it is difficult for instructors to give individual attention to all the students or adequately manage individual learning issues. This condition also creates distractions and noise, which contribute to it becoming harder for students to focus on complex chemistry principles, which require a high level of concentration and critical thinking (Adesina & Okojie, 2020). Another essential challenge is the inadequate availability of laboratory facilities, poorly ventilated and lit laboratories and classrooms.

Chemistry is a subject that depends on practical work for students to grasp theoretical concepts. Unfortunately, many schools in Edo State lacked adequately equipped laboratories and where laboratories do exist, they are often outdated or lacking the essential apparatus needed for experimentation. (Okolafor & Omoifo, 2014). This situation mirrors the broader challenges faced by schools in Edo Central Senatorial district. The absence of

materials such as chemicals, glassware, and protective apparatus greatly inhibits students' ability to do hands-on work, which is central to the learning of topics in chemical reactions and titrations. Therefore, the students are limited to operate with theoretical concepts only without practicality, which prohibits their learning and memory for key concepts (Adesina & Okojie, 2020). In addition, insufficiency in teaching materials like textbooks, multimedia materials, and instructional aid aggravates the situation. As a science subject, chemistry most of the time requires the application of visual aids and step-by-step teaching materials so that abstract concepts can be broken down into simpler elements. However, these schools lack adequate materials to enable students learn chemistry, and so teachers are left with no choice but to devise creative means of learning or simply conducting lectures. Inadequate resources will restrict the efficiency of teaching and could make learning chemistry appear much more daunting, thus leading them to disengage and ultimately, underperform.

A conducive environment plays a crucial role in academic achievement. In Chemistry, the lack of proper facilities and resources not only hinder the students' ability to understand complex concepts leading to poor performance and diminished enthusiasm for the subject. Without the required equipment and proper environment, even gifted students might not be able to achieve enough academically. While there is a broad consensus that environmental factors significantly affect student performance, there remains a notable gap in research specifically addressing the impact of these conditions on chemistry performance in Edo Central Senatorial District. Previous studies have explored the relationship between the learning environment and academic achievement in various contexts. For instance Aina and Ajayi (2022) found that students in classrooms with modern facilities and active teacher-student engagement consistently outperformed those in under-resourced environments. However, most of these studies have focused on general academic performance or specific subjects like Mathematics, Biology, Physics, with limited attention to chemistry. (Adewale et al, 2021). Additionally, there is no substantial research on the effects of physical, social and psychological learning environment on academic achievement (e.g., Olaniyan and Ojo, 2014). Empirical studies on how these factors influence chemistry education in Edo Central Senatorial District are lacking. Due to the forgoing, there is need for further research,

specifically on how the learning environment influences chemistry achievement in Edo Central Senatorial District.
Therefore, this research seeks to investigate the impact of classroom learning environment on the academic achievement of chemistry students in secondary schools in Edo Central Senatorial District.

Statement of the Problem

The classroom academic learning environment is an important determinant of students' academic performance, especially in chemistry, which demands high cognitive processing and abstract thinking. Despite the importance of chemistry, the majority of secondary schools in Edo Central Senatorial District, Nigeria, have major issues in the provision of an appropriate learning environment.

Some of the key issues are overcrowded classrooms, inadequate laboratory equipment, poor lighting, poor ventilation, and a lack of instructional materials. These physical limitations, in combination with large class sizes and little individualized instruction, discourage students from learning challenging chemistry concepts. The psychological and social aspects of the learning environment, such as emotional safety, student collaboration, and positive teacher-student relationships, are also generally neglected. Such difficulties result in disengagement, fluctuating academic performance and widening achievement gaps. There is a pressing need to investigate the specific impacts of such environmental factors on the academic achievement of chemistry students in this area, with a view to informing improvement initiatives and ensuring that students are provided with the type of support necessary for success in this fundamental subject. Thus, the research problem statement for this study is: What influence will learning environment have on chemistry students' achievement?

Research Questions

The following research questions guided the study:

1. What types of classroom learning environment exist in secondary schools in Edo Central Senatorial District?
2. To what extent do the classroom learning environment influence chemistry students' academic achievement?
3. To what extent does the conducive classroom learning environment influences male and female chemistry students' academic achievement?

Hypotheses

The following hypotheses were tested at 0.05 level of significance;

HO_1: There is no significant difference in the achievement of chemistry students taught in a conducive and Non-conducive learning environment.
HO_2: There is no significant difference in the academic achievement of male and female students who learnt chemistry in a conducive classroom learning environment?

Purpose of the Study

The main purpose of the study is to investigate the influence of classroom learning environment on chemistry students' achievement in Edo Central Senatorial District in Edo State. Specifically, the study seeks to determine;

1. The type of learning environment existing in Edo State
2. The extent to which classroom learning environments influences the academic achievement of chemistry students.
3. The extent to which conducive classroom learning environment influences students' academic achievement in chemistry based on gender

Methodology

The study adopted a survey research design, which is appropriate for examining relationships between variables in natural settings without manipulating them. The population for the study includes all senior secondary school two (SS11) chemistry students in Edo Central Senatorial District of Edo State. The total population size is around three thousand (3,500) students, distributed across 35 secondary schools in the five (5) Local Government Areas in Edo Central Senatorial District (Edo State Ministry of Education, 2020).

The sample of the study consists of hundred (300) S11 Chemistry students from 8 public mix senior secondary schools and 8 private mix senior secondary schools, selected from 5 Local Government Areas in Edo Central Senatorial District. The selected schools for the study were randomly selected using stratified random sampling technique, ensuring that both urban and rural schools were represented and the classes were selected using simple random techniques (drawing with replacement) for schools that have more than one arm of SS11 class.

The instruments used for data collection was Classroom Learning Environment Questionnaire (CLEQ), designed by the researcher. It consists of three sections; Sections A elicits information of students' bio data, Section B consists of 22 items raised on physical, social and psychological environment. The responses to the CLEQ were framed on a 4-point-likert scale of Strongly Agree (SA, 4), Agree (A, 3), Disagree (D, 2) and Strongly Disagree (SD, 1). The chemistry

achievement test is made up of two sections: Section A elicits information on students' bio-data and section B contains 50 test items of option A-E containing one correct answer and four distracters. The instruments were face validated by three experts; one science educator, a chemistry teacher and one measurement and evaluation expert. They looked at the instrument alongside the research question and raised hypotheses and they all affirmed the instrument will be able to generate data to answer the Research Questions and test the formulated hypotheses. And the content validity of the CAT was determined using a table of specification based on Blooms taxonomy to ensure that the concepts are rightly covered.

In order to determine the reliability of the instrument, the instrument was administered to thirty (30) students in Abraka Grammar school, Abraka Delta State. These students were not part of the sample for the study. The data collected were analyzed using Conbach alpha statistics and it yielded a reliability coefficient value of 0.78. The statistics is appropriate because the instrument was developed on a four point Likert scale.

Data were collected through face-to-face administration of the CLEQ, which was done during class hours, and this is to ensure 100% return rate of the administered instrument. The data collected were analyzed using frequency and percentage, mean, standard deviation and independent sample t-test. Frequency and percentage was used to answer research question one, mean and standard deviation was used to answer research question 2 and 3 while independent sample t-test statistics was used to test hypothesis one.

Results

The results from the analysis of data are presented in tables. The interpretation of the results followed the tables. The results are presented in accordance with the research questions and the corresponding hypotheses that guided the conduct of this study.

Research Question 1: What types of classroom learning environment exists in secondary schools in Edo Central Senatorial District?

To answer this research, frequency, percentage and mean statistics were used to analyze the data collected

Table 1: Descriptive statistics of Frequency (F) and Percentage (%) showing the ratings on the nature of classroom learning

environment in secondary schools in Edo Central Senatorial District

S/N	Items on Learning environment	Agree F (%)	Disagree F (%)	Mean
1	My classroom is equipped with the necessary materials (e.g., textbooks, lab equipment) to support my learning.	120(40)	180(60)	2.32
2	The physical layout of my classroom allows for easy interaction and collaboration with my classmates.	140(47)	160(53)	2.29
3	My classroom is well maintained and organized, which helps me focus better on my studies.	130(43)	170(57)	2.32
4	We have sufficient resources for hands-on learning experiences (e.g., science labs).	100(33)	200(67)	2.13
5	The classroom is adequately ventilated and has sufficient lighting for effective learning.	120(40)	180(60)	2.16
6	My teacher encourages us to ask questions and participate actively during lessons.	180(60)	120(40)	2.66
7	There is a positive relationship between my classmates and me, which enhances our learning experience.	200(67)	100(33)	2.67
8	Students in my class treat each other with respect and kindness.	210(70)	90(30)	2.79
9	I feel comfortable working in groups with my classmates during projects and activities.	160(53)	140(47)	2.46
10	I have opportunities to take on leadership roles during class activities or projects.	110(37)	190(63)	2.20
11	I feel that my contributions in class discussions are valued by both my teacher and classmates.	174(58)	126(42)	2.56
12	I feel safe and comfortable expressing my thoughts and opinions in class.	170(57)	130(43)	2.51
13	There are clear rules about behaviour and expectations in our classroom.	202(67)	98(33)	2.62
14	The atmosphere in my classroom is conducive to effective learning.	138(46)	162(54)	2.37
15	I believe that the classroom learning environment positively influences my achievement in Chemistry.	180(60)	120(40)	2.66
16	My teacher shows enthusiasm for teaching, which motivates me to learn more about Chemistry.	188(63)	112(37)	2.52
17	The school environment supports my mental health and well-being while studying challenging subjects.	130(43)	170(57)	2.22
18	My teacher effectively integrates technology into our lessons (e.g., videos, simulations).	106(35)	194(65)	2.68
19	My teacher provides constructive feedback on my assignments and assessments.	140(47)	160(53)	2.29

20	I feel encouraged to share my ideas and opinions during class discussions.	164(55)	136(45)	2.54
21	My teacher uses a variety of teaching methods to keep lessons engaging and interesting.	178(59)	122(51)	2.29
22	The topics we study are relevant to real-life situations and applications in Chemistry.	170(57)	130(43)	2.51

Table 1 shows the analysis of the classroom learning environment in secondary schools in Edo Central Senatorial District showing a mean rating ranging from 2.13 to 2.79, with an average mean of 2.44. Since the criterion mean for assessment is 2.50, any score below this threshold reflects a low rating of the classroom environment. In the physical learning environment (items 1-5), all items are rated poorly, indicating that while the classroom has necessary materials, issues such as organization, layout, and resources for hands-on learning are inadequate. The lowest mean score of 2.13 indicate a significant deficiency in resources for hands-on learning experiences, such as science labs, which is a critical component of the physical learning environment.

The social learning environment (items 6-14) shows a more positive picture. Items related to teacher encouragement, respect among classmates, and clear behavioral expectations receive high ratings, suggesting a supportive atmosphere. The highest mean score of 2.79 highlights this favorable aspect, where students feel that their peers treat one another with respect and kindness. However, areas like group work and leadership opportunities are rated poorly, indicating that more effort is needed to foster collaboration and active participation among students. In the psychological learning environment (items 15-24), there are mixed results.

Research Question 2: To what extent does the classroom learning environment influence chemistry students' academic achievement?

To answer research question 2, descriptive statistics of the mean and standard deviations was used to analyze the data collected and the result is shown in Table 2

Table 2: Descriptive statistics of the mean and standard deviations showing the mean scores of students taught in conducive and non-conducive learning environments

Learning Environment	N	Mean	Mean Diff	SD
Conducive	85	55.76	10.85	13.79
Non-Conducive	215	44.91		15.07

Table 2 shows that the chemistry students who learnt chemistry in a conducive learning environment had a mean score of 55.76 with a standard deviation of 13.79 and those who learnt in a Non-conducive learning environment had a mean score of 44.91 with a standard deviation of 15.07. There exists a mean difference of 10.85 in favour of those who learnt in a Conducive learning environment. To determine if the difference is significant, independent sample t-test statistics was used to test hypothesis one and the result is shown in Table 3.

HO_1: There is no significant difference in the achievement of chemistry students who learnt chemistry in a conducive and Non-conducive learning environment.

In order to test hypothesis one, independent sample statistics was used to analyze the data collected and the result is shown in Table 3

Table 3: Independent sample Statistics comparing the mean scores of chemistry students who learnt chemistry in conducive and Non-conducive learning environment

Learning Environment	N	Mean	Mean Diff	SD	df	t_{cal}	Sig (2-tailed)
Conducive	85	55.76	13.79	10.85	298	5.758	.000
Non-Conducive	215	44.91	15.07				

Table 3 shows that there is a significant difference in the achievement of chemistry students taught in conducive learning environment and Non-conducive learning environment, since the calculated sig value of 0.000 which is less than 0.05 alpha value was obtained. With this, H_{01} which states that there is no significant difference in the achievement of chemistry students who learnt chemistry in a conducive and Non-conducive learning environment is rejected. This is because the difference which is observed between the mean scores of chemistry students who learnt chemistry in conducive and non-conducive learning environment is significant indication that those students in the conducive learning environment learnt chemistry better than their counterparts.

Research Question 3: To what extent does conducive classroom learning environment influences male and female students' academic achievement in chemistry?

To answer research question 3, descriptive statistics of the mean and standard deviations was used to analyze the data collected and the result is shown in Table 4.

Table 4: Descriptive Statistics of mean and standard deviations showing the mean scores of male and female students in conducive

Sex	N	Mean	Mean Diff	SD
Male	37	63.78	14.20	16.93
Female	48	49.58		5.53

Table 4 shows that the male chemistry students who learnt chemistry in a Conducive learning environment had a mean score of 63.78 with a standard deviation of 16.93 and their female counterparts had a mean score of 49.58 with a standard deviation of 5.53. There exists a mean difference of 14.20 in favour of the male student. To determine if the difference is significant, independent sample t-test statistics was used to test hypothesis two and the result is shown in Table 5.

HO_2: There is no significant difference in the achievement of male and female chemistry students who learnt chemistry in a conducive learning environment

In order to test hypothesis two, independent sample statistics was used to analyze the data collected and the result is shown in Table 5.

Table 5: Independent sample Statistics comparing the mean scores of male and female students who learnt chemistry in a conducive learning environment

Sex	N	Mean	Mean Diff	SD	df	t_{cal}	Sig (2-tailed)
Male	37	63.78	14.20	16.93	83	5.454	0.000
Female	48	49.58		5.53			

Table 5 shows that there is a significant difference in the achievement of male and female students taught chemistry in a conducive learning environment, since the calculated sig. value of 0.000 which is less than 0.05 alpha value was obtained. With this, H_{02} which that there is no significant difference in the achievement of male and female chemistry students who learnt chemistry in a conducive is rejected. This shows that the conducive learning does not have equal influence on the achievement of male and female chemistry students' achievement.

Discussion of Findings

The study's first finding showed that most students agreed that their learning environment was non-conducive. The table shows the analysis of the classroom learning environment

in secondary schools in Edo Central Senatorial District showing a mean rating ranging .In the physical learning environment all items are rated poorly, indicating that while the classroom has necessary materials, issues such as organization, layout, and resources for hands-on learning are inadequate. The lowest mean score indicated a significant deficiency in resources for hands-on learning experiences, such as science labs, which is a critical component of the physical learning environment. The social learning environment shows a more positive picture. Items related to teacher encouragement, respect among classmates, and clear behavioral expectations receive high ratings, suggesting a supportive atmosphere. The highest mean score highlights this favorable aspect, where students feel that their peers treat one another with respect and kindness. However, areas like group work and leadership opportunities are rated poorly, indicating that more effort is needed to foster collaboration and active participation among students. In the psychological learning environment, there are mixed results. While students feel motivated by their teacher's enthusiasm and find lessons relevant to real-life applications, several items related to mental health support and constructive feedback are rated poorly. The overall atmosphere is not seen as conducive to effective learning, highlighting a need for improvement in emotional support and engagement strategies. These findings emphasize that while some social aspects of the classroom are favorable, there are substantial gaps in both physical and psychological elements of the learning environment. Many students expressed concerns about the inadequacy of classroom materials, indicating that insufficient resources such as textbooks and lab equipment hinder their ability to engage fully in their studies. Additionally, inadequate ventilation and lighting were highlighted as factors that impact concentration and overall comfort during lessons. The result on the physical learning environment may be due to the poor funding of the educational sector and the embezzlement of funds and that of the social learning environment is due to the adequate training of chemistry teachers in both lesson delivery and classroom management techniques. This finding agrees with Yusuf & Jahun (2022) emphasized the critical role of ventilation, recommending that school administrators prioritize it to improve student comfort and engagement.

The second finding of the study showed that the classroom learning environment can directly affect chemistry students' academic achievement. This was why a significant difference was

found in the mean achievement scores of chemistry students who learnt chemistry in a Conducive and Non-conducive learning environment. The chemistry students who learnt chemistry in a conducive learning environment obtained a high mean score than their counterparts who learnt chemistry in a Non-conducive learning environment and this was found significant. This finding can be due to that fact that the Conducive learning environment offered the students an opportunity to learn providing both adequate physical facilities, social and psychological stable environment which enhanced their ability to concentrate, participate during class activities. This finding aligns with that of Udeani & Nwosu (2022), who found that the physical and psychological comfort of the classroom directly correlates with improved student achievement and that of Richard, (2020) whose study confirmed that students attending schools with a pleasant physical environment perform better academically than those in less conducive environments. Also Richard, (2020) study indicated that adequate school facilities create a positive educational climate, which is essential for effective student learning. It also agreed with the findings of Ajaja & Eravwoke, (2010), who found that a positive social learning experiences encourages cooperative learning which fosters a sense of belonging and develop essential social skills needed that not only boosts academic performance but also supports the emotional and social development of students.

Lastly, the third findings of the study showed a significant difference in the achievement of male and female Chemistry students who learnt Chemistry in a Conducive learning environment. This findings show that the male students benefitted more from the learning environment, this is because male students are generally more assertive, competitive, and willing to take risks in classroom settings. These traits often lead to higher participation and engagement, especially in environments that encourage active involvement. Female students, on the other hand, may perceive the environment differently due to societal or internalized expectations, which can make them less confident or hesitant to participate fully. Additionally, the female students may be carried away by the comfort they enjoy at the expense of their study due to their genetical make up. This disagrees with the study by Barbara and Cynthia (2021) who investigated the differences between male and female Students' achievement of School Library Learning Environments. The researchers' results indicated that females generally have higher expectations of their learning environments than males, and

experience less satisfaction with their actual learning environment than males which lead to a lower academic achievement when compared to the male. It also disagrees with the findings of Htay and Sann, (2020)'s investigation on the influence of classroom environment on the academic achievement of high school students whose findings showed that female students performed better in a conducive classroom environment than male students.

Conclusion

Based on the findings of the study, following conclusions were drawn;

It can be concluded that most secondary schools in Edo Central Senatorial District lacks conducive learning environment.

Secondly, based on the findings of the study, it can be concluded that classroom learning environment influences students' academic achievement and that male students learn better than female students in a conducive learning environment.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. School administrators should prioritize enhancing classroom conditions by ensuring adequate lighting, proper ventilation, and comfortable seating arrangements. These improvements are crucial for fostering an environment that promotes student focus and engagement.
2. Educational stakeholders such as policy makers, school administrators, teachers and parents should ensure that classrooms are equipped with necessary learning materials, such as textbooks, lab equipment, and technology. This provision will support hands-on learning experiences and enhance students' academic performance.
3. Schools should implement a maintenance culture to keep classrooms organized and well- maintained. Regular checks and upkeep of facilities will create a more inviting and effective learning atmosphere.

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