MOTIVATIONAL TEACHING STRATEGIES AND AVAILABILITY OF LABORATORY FACILITIES AS CORRELATES OF ACADEMIC PERFORMANCE OF STUDENTS IN CHEMISTRY IN AKWA IBOM STATE

By
Akemini Udo. ESSIEN
Department of chemistry
School of Science
Akwa Ibom State College of Education
Afaha Nsit
And
Samuel Matthew AKPAN, Ph.D
(Senior Lecturer, Measurement and Evaluation, Research and Statistics.)
Department of Educational foundations,
University of Calabar,
Calabar, Nigeria

ABSTRACT

This study investigates the link between the availability of laboratory facilities and motivating teaching styles as important predictors of students' academic achievement in Chemistry in Akwa Ibom State. The research however, emphasizes on the significance of good teaching strategies and sufficient resources in promoting academic achievement, especially considering the crucial role that Chemistry plays in the scientific and technical growth of society. Moreover, structured questionnaires were utilized to gather data, with an emphasis on the perceived influence of lab resources and motivating teaching strategies on students' academic performance. The results show a strong positive link between students' performance in Chemistry and the application of motivated teaching strategies. Similarly, it has been discovered that having access to and using laboratory equipment appropriately helps students comprehend and remember difficult chemical ideas, which in turn improves their academic achievement. The study also comes to the conclusion that the best way to maximize students' academic progress in Chemistry is to combine an emphasis on motivating teaching with the availability of well-equipped laboratories

KEYWORD: Motivational Teaching Strategies, Laboratory Facilities, Academic Performance, Chemistry and Akwa Ibom State.

INTRODUCTION

Chemistry is an essential subject for schools because it helps students grasp difficult scientific concepts and advances technology in all societies. Concerns about students' academic performance in Chemistry have been raised by educators, legislators, and stakeholders in Akwa Ibom State, as well as in many other territories. This issue arises from the discrepancy that has been noted between students' potential and actual performance in Chemistry as this has led to the necessity of doing a thorough analysis of the variables affecting this academic result.

The use of motivational teaching techniques has grown in popularity as a critical factor in determining student engagement and academic achievement. According to Usman and Afolabi (2020), motivational strategies such as positive reinforcement, goal-setting, and interactive learning environments can significantly enhance students' interest and participation in Chemistry, thereby improving their academic performance. These are critical strategies in a topic like Chemistry, where learning difficult concepts demands not just positive attitude but also cognitive engagement.

Additionally, adequate and readily available laboratory facilities are essential to the teaching and learning of chemistry. Students can conduct practical experiments in laboratories, which is an essential part of learning theoretical ideas and honing scientific abilities. As noted by Nwosu and Uchenna (2019), the effectiveness of laboratory-based learning is directly linked to the availability of well-equipped and functional laboratories, which facilitate experiential learning and enhance students' comprehension of abstract chemical phenomena.

An important field of research is the relationship between the availability of laboratory facilities and motivational teaching strategies, especially in relation to how these elements together affect students' academic success in Chemistry. A study by Johnson and Ekpo (2021) highlights the synergistic effect of these variables, suggesting that when motivational teaching is coupled with adequate laboratory resources, students are more likely to achieve higher academic outcomes.

The purpose of this study is to look at the relationship between scientific achievement of Chemistry students in Akwa Ibom State, the availability of laboratory facilities, and motivational teaching styles. However, the study aims to contribute to the larger objectives of scientific literacy and technological development in the area by investigating these relationships and offering insights into how educational practices and resource allocation can be optimized to improve students' academic achievements in Chemistry.

CONCEPT OF MOTIVATIONAL STRATEGIES

The approaches and practices teachers use to pique students' interest, involvement, and dedication to learning are referred to as motivational strategies in education. The goal of these strategies is to affect students' intrinsic and extrinsic motivation, two factors that are vital for scholastic achievement. Students that are motivated by their own genuine interest in the material and the joy they gain from grasping new ideas are said to be intrinsically motivated. In contrast, extrinsic motivation is derived from outside sources like accolades, scores, or social acceptance. However, the way that students approach learning and perform academically as a whole is greatly influenced by both forms of motivation. Motivational strategies have a major influence on students' learning results, according to research. As mentioned by Bandura and Schunk (2019), motivational strategies such as goal-setting, positive reinforcement, and the use of challenging yet achievable tasks can enhance students' self-efficacy, leading to increased persistence and effort in academic tasks. With the use of these strategies, students may cultivate a growth mindset in which they see setbacks as chances for progress rather than as barriers to achievement. A research by Nwachukwu et.al, (2020) highlights that Mentoring entails coaching, supervising and guiding the teachers in the school as it plays an important role not only in the case of support for the development of teachers' professional skills but also enhancing the student's performance. Using feedback is one of the most successful motivational techniques.

As highlighted by Zimmerman and Moylan (2020), timely and constructive feedback helps students recognize their progress, understand areas that need improvement, and maintain motivation to achieve their academic goals. Students who get feedback that is detailed and centers around the process rather than the result are more likely to adopt a mastery-oriented approach, which has been associated with greater academic success levels. The establishment of a positive and stimulating learning environment is a crucial component of motivational techniques. Students' motivation to study can be increased by teachers who help them feel like they belong and who support teamwork. As noted by Deci and Ryan (2018), when students feel supported and valued within the classroom, they are more likely to take ownership of their learning and engage deeply with the content. It has also been shown that including a variety of engaging teaching strategies, such as inquiry-based instruction and project-based learning, boosts students' motivation by giving their education greater significance and relevance. These methods allow students to connect their learning to real-world contexts, thereby increasing their interest and investment in the subject matter (Usman & Afolabi, 2020).

CONCEPT OF LABORATORY FACILITIES

Laboratory facilities are settings for conducting analyses and doing scientific research and development. Their distinctive features, which connect research or educational activities to a particular subject or set of disciplines, are usually a specialized room arrangement or special purpose equipment as individuals or groups may engage in these activities, and supervision may or may not be provided. Ufonabasi and Michael (2020) explained that, laboratory facilities are materials or resources that can be used to ease, encourage, improve and promote teaching and learning activities in the laboratory. In order to impart knowledge to the students, a scientific teacher employs these tools or resources.

To improve comprehension of ideas, abilities, and competences in the teaching-learning process, laboratories offer a variety of educational resources that both educators and students may utilize. In order

to help students acquire concepts and information, these facilities use explicit communication. However, the tools for active learning and assessment are laboratory facilities in educational classes. An instructional material might be anything that a teacher utilizes to support his teaching of a student. Hence, well-equipped classrooms facilitate solid science comprehension. Ekanem and Obodom (2019) Laboratory has been conceptualized as a room or a building specially built for teaching practical terms. Using laboratory facilities to teach science and other related topics has the impact of "seeing is believing," as students tend to retain and understand what they see rather than what they are told or hear.

Franklin, (2024), affirmed that, through laboratory facilities, schools can impact their students' attachment, commitment to all science activities, and academic accomplishment. Furthermore, inadequate laboratory facilities in schools make it more difficult for instructors and students to perceive a clear emphasis on academic goals and the learning environment. As a result, these schools are less likely to be favorable to learning. The success of any scientific course greatly depends on the laboratory facilities provided for it as the laboratory facilities are vital to the teaching of science.

The creation of critical abilities and skills, such as the ability to formulate scientific questions, design studies, create scientific interpretations, and present persuasive scientific arguments, is facilitated by laboratory facilities. Laboratory facilities in science education serve as a cornerstone, offering students invaluable practical and visual learning experiences that stimulate creativity, ignite a passion for research, and instill a profound connection with nature and the environment. Edalin and Nuevo (2024).

Fig 1: Picture of Chemistry Laboratory Facilities

CONCEPT OF ACADEMIC PERFORMANCE

Academic performance, often known as academic achievement, is the phrase used to describe a student's success at an institution after finishing a course or subject. Through formative and summative evaluations, it gauges students' learning across a range of academic areas. It describes what happens when students work hard to achieve certain learning objectives. According to Udosen & Edem (2024) academic performance is the measurement of students' achievements across various academic subjects. Indicators of academic performance include completion time, grades, and performance in particular topics as it has great importance for individuals who are concerned about their education.

Academic performance is a multifaceted concept that takes into account a student's growth and accomplishments in the classroom. It is the degree to which a student has met their immediate or long-term learning objectives. Monday & Ekong (2024) mentioned that academic performance includes cognitive and non-cognitive outcomes, as well as psychological and behavioral outcomes. Monday & Ekong furthermore stated that that academic achievement holds great importance for individuals who are concerned about their education. Furthermore, the results are not entirely clear on whether individual aspects may accurately predict academic performance. Therefore, while creating models of school accomplishment, factors like exam anxiety, surroundings, motivation, and emotions need to be taken into account.

The term "academic performance" refers to a student's achievement after the conclusion of a course or semester. It evaluates students' learning in a variety of academic topics using formative and summative evaluations (Mmaduka, Essien & John, 2024). Academic performance is a notion that acknowledges the significance of the teaching-learning process as well as the growth of students' expectations, knowledge, abilities, and attitudes. It is also impacted by personal traits, outlooks, and commitment to learning. Teachers are urged to innovate their educational techniques and support students in achieving deliberate competencies in order to increase academic performance. Students should also adopt effective learning

strategies and stay motivated. Academic performance is characterised by the following: knowledge acquisition; skill and competency acquisition; good grades and comparable academic accomplishments; obtaining a career advancement; and intention and perseverance towards education. Education also implies the development of transformable knowledge and capabilities (Bassey, 2019).

TYPES OF MOTIVATIONAL TEACHING STRATEGIES

Techniques that encourage a person's goal-related behavior are known as motivational strategies. Because highly motivated students often achieve the highest learning results, motivational teaching strategies are important to student learning. Teachers may encourage and boost their pupils' motivation in a variety of ways. The several kinds of motivating teaching strategies are listed below:

- **Goal-Setting and Self-Assessment**

Establishing goals and objectives, whether they be academic or personal, gives students a clear direction for their work and is a very effective motivational teaching strategy. By tracking their progress towards these goals, students may develop a feeling of accountability and self-efficacy through self-assessment. According to Clark (2019), when students are actively involved in setting their own learning goals, they are more likely to be motivated and engaged in the learning process.

- **Praise and Positive Reinforcement**

Positive reinforcement and praise are powerful tools for promoting desirable behaviours and academic success. Students' drive to do well is increased when they get positive reinforcement, which includes verbal praise, prizes, or acknowledgement for their efforts and accomplishments. Akpan and Edet (2020) highlight that timely and specific praise can significantly enhance students' intrinsic motivation by making them feel valued and capable.

- **Active Learning Techniques**

Engaging students in activities that demand their active participation in the learning process like group discussions, problem-solving exercises, and practical experiments is known as active learning. These teaching methods encourage a deeper comprehension and memorization of the subject matter. Eze and Okoro (2018) emphasize that active learning strategies not only improve student motivation but also foster critical thinking and collaboration skills.

- **Incorporation of Technology**

By making learning more interesting and applicable to students' daily lives, educational applications, online resources, and interactive technologies may all be used in the classroom to increase student motivation. Technology can provide personalized learning experiences and immediate feedback, which are crucial for maintaining student interest and motivation (Nwankwo & Uzochukwu, 2021).

- **Collaborative Learning**

Peer teaching, group projects, and study groups are examples of collaborative learning practices that motivate students to cooperate in order to accomplish shared objectives. By fostering a feeling of community, this method not only increases motivation but also enables students to benefit from one another's skills. Okeke and Anozie (2019) found that students who engage in collaborative learning activities are more motivated and perform better academically compared to those who work individually.

- **Relevance and Real-World Connections**

Students' motivation to study may be greatly increased by making the material relevant to their life and future employment. Students are more likely to be motivated and involved in class when they can understand how what they are studying will benefit them in real life. Asogwa (2020) notes that integrating real-world examples and scenarios into lessons helps students understand the value of their education and its relevance to their personal and professional lives.

TYPES OF LABORATORY FACILITIES FOR CHEMISTRY

Chemistry is taught and learnt mostly through laboratory facilities, which provide students the

practical experience needed to comprehend and apply theoretical principles. The caliber and range of laboratory facilities that are accessible have a major impact on how well chemistry is taught. These facilities fall under the following general categories:

- **General-Purpose Chemistry Laboratories**

All-purpose Numerous experimental activities may be accommodated in this chemistry laboratories due to their design. These labs are usually furnished with conventional equipment, including balances, Bunsen burners, glassware (beakers, flasks, test tubes), chemical reagents, and other supplies that facilitate the basic experiments in Chemistry. According to Nwankwo and Okeke (2019), these laboratories are essential for conducting basic experiments in areas such as acid-base titration, chemical reactions, and material synthesis. They provide students the opportunity to put their theoretical knowledge to use in a supervised setting, strengthening their comprehension of fundamental topics in chemistry.

- **Specialized Chemistry Laboratories**

Chemical subjects that are more complex and specialized, like organic chemistry, analytical chemistry, or biochemistry, are the focus of specialized laboratories. The equipment and specialized tools in these labs are designed to meet the particular requirements of these sub-disciplines. For instance, an organic chemistry lab may include facilities such as fume hoods, rotary evaporators, and distillation apparatus, which are essential for handling volatile organic compounds and conducting synthesis reactions (Olatunji & Fashola, 2020). In contrast, specialized chemistry laboratories are frequently furnished with advanced equipment like pH meters, chromatographs, and spectrophotometers, which allow students to conduct accurate quantitative and qualitative tests. With these specialized resources at their disposal, students may delve deeper into the intricacies of Chemistry, better equipping them for careers in research and industry.

- **Digital and Virtual Chemistry Laboratories**

As a result of technological advancements, virtual and digital laboratories have become cutting-edge resources for Chemistry teaching. According to Nwachukwu & Ohalete (2024), technological innovations, globalization, altering student demographics, and evolving societal expectations have all contributed to a remarkable evolution of higher education in recent years. These facilities recreate laboratory studies in a virtual setting using computer simulations, augmented reality (AR), and virtual reality (VR). Virtual laboratories, on the other hand, provide a secure and affordable substitute for carrying out research that would be too risky, costly, or time-consuming in a conventional environment. Additionally, they provide students the freedom to practice and conduct experiments again without being limited by material resources. As an invaluable addition to traditional laboratory facilities, digital laboratories are especially helpful in improving students' comprehension of complex topics through immersive and interactive learning experiences.

Fig 2: Picture of Chemistry Laboratory Facilities

Fig 3: Picture of Chemistry Laboratory Facilities

EFFECTS OF MOTIVATIONAL TEACHING STRATEGIES ON PERFORMANCE OF STUDENTS' IN CHEMISTRY

The use of effective motivational strategies can close the achievement gap between students and potential by creating a supportive learning environment that fosters perseverance, curiosity, and a positive attitude towards learning. The following are the effects of motivational teaching strategies on students' performance in chemistry:

- **Enhancement of Student Engagement and Interest**

The improvement of student engagement and interest in Chemistry is one of the main outcomes of motivating teaching strategies. Chemistry may be made more accessible and interesting for students by teachers who use techniques including the incorporation of technology, real-world examples, and interactive teaching methods. For instance, the use of simulations and virtual labs has been shown to increase students' interest in Chemistry by allowing them to visualize and interact with complex chemical processes in a more accessible and less intimidating way (Olatunji & Fashola, 2020). This enhanced involvement is important because it results in a greater comprehension of the material and more active participation in class activities.

- **Improvement in Academic Performance**

The academic achievement of students is directly impacted by motivational teaching techniques as improved academic achievements in Chemistry have been associated with strategies including goal-setting, formative feedback, and positive reinforcement. According to Adewale and Adeyemi (2019), students who are consistently encouraged and provided with constructive feedback are more likely to develop a growth mindset, which in turn fosters resilience and a willingness to tackle challenging Chemistry problems. Furthermore, studying for comprehension rather than just rote memorization can assist reduce anxiety and encourage a focus on motivating techniques that prioritize mastery over performance objectives, which can lead to improved assessment performance.

- **Development of Critical Thinking and Problem-Solving Skills**

Motivational teaching techniques can play a major role in helping students acquire the critical thinking and problem-solving abilities that are necessary for chemistry. The use of open-ended questions, inquiry-based learning, and collaborative learning strategies push students to think critically and consider several approaches to issues. For example, when students work in groups to solve complex Chemistry problems, they are motivated to share ideas, debate different approaches, and refine their reasoning skills, all of which are essential for success in Chemistry (Nwosu & Okoli, 2021). In addition to enhancing academic achievement, this cooperative, inquiry-based method equips students to tackle real-world scientific problems.

- **Reduction of Dropout Rates and Increased Retention**

Reduction in dropout rates and improvement in retention in Chemistry courses are important outcomes of motivational teaching strategies as pupils who experience motivation and encouragement are more likely to stick with their studies. even when presented with challenging material. According to a study by Ibe and Okoro (2018), schools that implement motivational strategies such as mentoring, peer tutoring, and the provision of extra support for struggling students have reported lower dropout rates and higher retention in science subjects, including Chemistry. These strategies support students' emotional and psychological needs while also fostering a feeling of belonging and confidence, both of which are essential for maintaining sustained academic engagement.

EFFECTS OF LABORATORY FACILITIES ON ACADEMIC PERFORMANCE OF STUDENTS IN CHEMISTRY

In science education, laboratory facilities are vital, especially in Chemistry, where grasping complicated ideas and encouraging scientific curiosity require real, hands-on experience. The availability and caliber of laboratory facilities have a big impact on how well students do academically in chemistry because they offer the resources and setting needed for inquiry, experimentation, and learning. Well-equipped laboratories have been repeatedly found to increase students' academic performance in Chemistry

by improving their understanding of theoretical ideas.

- **Enhancement of Practical Skills and Conceptual Understanding**

With the help of practical experiments, students can observe chemical reactions, manipulate substances, and measure outcomes, which helps them to better understand abstract concepts. Laboratory facilities give students the chance to become hands-on learners while reinforcing their theoretical knowledge. According to Ajayi and Ogunleye (2019), students who regularly use laboratory facilities show greater mastery of Chemistry topics such as stoichiometry, thermodynamics, and reaction kinetics. Students' ability to connect theory to practice through these hands-on experiences results in a deeper and more enduring comprehension of the material, which improves academic achievement.

- **Improvement in Academic excellence in chemistry**

Chemistry students' academic success is positively impacted by the availability of well-equipped laboratory facilities. Students can conduct a variety of experiments in laboratories that are well-stocked with chemicals, equipment, and contemporary technology. This is crucial for achieving success in both internal and external exams. Research by Okeke and Nwafor (2020) indicates that students with regular access to well-equipped laboratories perform better in Chemistry exams compared to their peers who lack such access. The practical experience that laboratories offer improves students' problem-solving abilities and their capacity to apply theoretical information in real-world situations, which is why their performance has increased.

- **Increased Student Motivation and Engagement**

Facilities for laboratories are essential for inspiring students and raising their level of interest in chemistry. Students' curiosity and excitement for the subject matter can be sparked by the dynamic and fascinating character of laboratory work. As highlighted by Eze and Olatunde (2021), students who are actively involved in laboratory experiments tend to develop a positive attitude towards Chemistry, which is reflected in their academic performance. Students are motivated to put in more effort in their studies since they feel more accomplished after performing experiments and finding results. This deeper interest in the subject is fostered.

- **Reduction of Achievement Gaps**

Additionally, laboratory facilities contribute to closing the attainment inequalities amongst pupils. Academic performance gaps can be reduced in settings where all students have equitable access to well-equipped laboratories. This is especially crucial in areas with a varied student body, since access to educational resources may be impacted by socioeconomic background variations. A study by Igbokwe and Chukwuemeka (2020) found that schools with well-maintained and accessible laboratories had smaller achievement gaps in Chemistry between students from different socio-economic backgrounds, suggesting that equitable access to laboratory facilities can contribute to a more level playing field in education.

CONCLUSION

In summary, this study affirms that both motivational teaching strategies and the availability of laboratory facilities are vital to enhancing students' academic performance in Chemistry in Akwa Ibom State. Effective motivational strategies engage students and boost their interest in learning, while well-equipped laboratories provide the practical experience necessary for deepening their understanding of complex concepts. Together, these elements create an optimal learning environment that fosters academic success. For sustained improvement in Chemistry education, it is essential for educators and policymakers to prioritize both effective teaching methods and the provision of adequate laboratory resources.

RECOMMENDATIONS

- Continuous training programs should be implemented to equip Chemistry teachers with advanced motivational teaching strategies that can effectively engage students and enhance their academic performance.

- Educational authorities should prioritize the provision and maintenance of well-equipped Chemistry laboratories in schools, ensuring that students have the necessary resources to conduct experiments and gain hands-on experience.
- Schools should adopt an integrated approach that combines motivational teaching with frequent laboratory sessions, enabling students to apply theoretical knowledge in practical settings, thereby improving comprehension and retention of complex Chemistry concepts.

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