

**ASSESSING SCIENCE TEACHERS LEVEL OF AWARENESS AND UTILIZATION OF HYBRID LEARNING APPROACH FOR EFFECTIVE STEM TEACHING IN JUNIOR SECONDARY THREE SCHOOLS IN BASSA, PLATEAU STATE.**

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**ABSTRACT**

*This study delved into assessing how familiar and proficient science teachers in Bassa, Plateau State are with the hybrid learning approach to enhance STEM teaching. The research followed a descriptive survey design, focusing on Bassa Local Government Area, and involved a sample of 260 science teachers randomly chosen from a total population of 332. To gather data on teachers' awareness, utilization, and challenges related to hybrid learning in STEM teaching, researchers employed a 30-item questionnaire. The questionnaire's validity was established through expert review, and its reliability, determined by the Spearman Brown correlation coefficient, yielded a coefficient of 0.82. Analysis of the collected data relied on mean and standard deviation calculations. The results uncovered a lack of awareness among science teachers about the hybrid learning approach, leading to its underutilization. Additionally, the study identified challenges hindering science teachers from effectively implementing hybrid learning. In response to these findings, recommendations were proposed, emphasizing the importance of science teachers adopting a proactive approach in embracing contemporary, technology-driven teaching methods to meet international standards. The guidance of learners in accessing resources for optimal learning was also underscored*

**INTRODUCTION**

The integration of innovative technological teaching methods into education has emerged as a critical and widely debated concern in contemporary education policy. Education experts contend that the proper utilization of these methods holds significant promise for enhancing teaching and learning, as well as shaping opportunities in the workforce (Udoh, 2015). To elevate the quality of classroom instruction, there is a growing consensus that traditional, teacher-centered approaches, which may not equip students with enduring skills or knowledge, need to be minimized. Ndirika (2015) argued that conventional teaching methods, assessed through traditional techniques, are ineffective, urging science teachers to embrace interactive alternatives such as cooperative, collaborative, and problem-based learning, as well as the hybrid learning approach.

According to recent studies, the hybrid teaching approach has shown promise in enhancing students learning and preparing them for future success (Graham, 2016). Hybrid learning involves a combination of in-person and online coursework, making education more engaging and accessible for all students. Bongman (2014) defined hybrid learning as the fusion of traditional face-to-face learning and distance learning, while Graham (2016) characterized it as the integration of face-to-face and electronic learning, employing diverse theories, methodologies, and techniques in the same setting, supported by various online technologies during the learning process.

This approach empowered science teachers to stay abreast of the latest research and implement new teaching methods for greater effectiveness in the classroom. By incorporating digital instruction and personalized face-to-face interactions, hybrid learning enhances efficiency, allowing teachers to provide individualized attention to struggling students during the additional class time. Utilizing new technological strategies in students' work improve comprehension of new concepts, enabling teachers to streamline instruction and support all students in reaching their full potentials. Various hybrid learning models, including model rotation, flex, self-blend, online driver, and face-to-face driver, offer science teachers options to enhance their students' education.

The focus on science teachers' awareness of new technological teaching strategies has gained considerable prominence in recent years. Despite the existence of various interfaces and studies designed to enhance awareness, it appeared that science teachers remained uninformed and do not incorporate numerous technological teaching strategies based on research findings aimed at improving the teaching and learning processes. This lack of awareness is reflected in the consistent decline in the performance of science students in external examinations (Bongman, 2014). Rossett (2013) attributed this academic decline to factors such as the inadequate scientific background of science teachers, a shortage of scientific equipment, and the incompetence of science educators, among other challenges.

Addressing poor students' attitudes and performances, the utilization of the hybrid learning approach becomes crucial. Bongman (2014) contended that science teachers often neglect the integration of blended learning into their teaching processes. Langford (2017) underscores the pivotal role teachers play in translating new methodological elements into effective teaching and learning processes. However, Abimbade (2015) argued that barriers such as infrastructural limitations and inadequate funding hinder teachers and education practitioners from adopting new teaching technologies. Queen (2012) noted that the use of Information and Communication Technology (ICT) in education enhances the effectiveness of the educational process, resulting in increased productivity through enhanced human capacity. This, in turn, contributes to the acquisition of basic knowledge and skills crucial for economic and educational development. According to Igboanuju and Egolum (2017), the productive capacity of a nation relies on the quality and competence of its teachers.

While the benefits of incorporating the hybrid learning approach in science teaching are significant, adopting this strategy without proper planning and consideration may lead to a wasteful endeavor. Ndirika (2015) contended that, in typical Nigerian public secondary schools, the implementation of hybrid learning appears elusive. Reasons for this include a lack of expertise among teachers, resistance to adapting to new strategies, outdated facilities, power supply challenges, and overcrowded classrooms. Many schools lack the necessary infrastructure for a hybrid learning, including inadequately equipped computer laboratories with functional computers, and the few available ones may be non-functional due to neglect. Previous research indicated that many secondary school science teachers lack computer or technology literacy (Udoh, Ohajua, & Ado, 2015). Additionally, a significant number of science teachers may view hybrid learning approaches as time-consuming, given the pressure of overloaded syllabi and expectations from administrators and external examination bodies. Consequently, science teachers often adhere to established methods without considering whether meaningful learning is being achieved.

Udoh (2015) asserted that most science teachers lack exposure to pre-service and in-service training, including seminars on ICT skill application and the restructuring of teacher education programmes to incorporate essential computer operation skills. Udoh (2015) further emphasize that science teachers must modern computer-driven teaching methods, as their role is not only to locate resources but also to guide learners in the learning process to meet international standards.

### **Statement of the Problem**

Despite the significance and popularity of science subjects among Nigerian students, academic performance in public senior secondary school examinations has not exhibited notable improvement (Udoh, 2015). The quest to understand the root causes of these consistently poor performances in science subjects has been a central focus of researchers in recent times. Among the identified factors contributing to poor academic outcomes is the lack of integration of new technological teaching strategies in the learning process which has emerged as a significant concern (Rojewski, 2010). Additional challenges include unengaging lack of students in science classes, that is often characterized by large class sizes, and inadequately equipped laboratories, all of which contribute to students' poor performance in science subjects (Ikitde & Udoh, 2015).

Recognizing the undeniable benefits of incorporating new technological teaching strategies into learning, especially in the contemporary world, various instructional approaches such as blended

learning have been introduced to teach science subjects. The prevailing global research trend underscores the use of computer facilities and resources to augment students' learning experiences. Considering the rate of decline in students' learning outcomes in science subjects, leading to elevated failure rates, it becomes imperative to prioritize science and technology as the cornerstone of national development. Therefore, this study seeks to investigate teachers level of awareness and utilization of the hybrid learning approach for effective STEM teaching in junior secondary schools in Bassa, Plateau State.

### **Purpose of the Study**

1. Determine science teachers' level of awareness of hybrid learning approach for effective STEM teaching.
2. Determine science teachers' level of utilization of hybrid learning approach for effective STEM teaching.
3. Determine the challenges of science teachers' utilization of Hybrid learning approach for STEM teaching by science teachers.

### **Research Questions**

The study was guided by the following research questions

1. What is the science teachers' level of awareness of hybrid learning approach for effective STEM teaching?
2. What is the science teachers level of utilization of hybrid learning approach for effective STEM teaching?
3. What are the challenges of science teachers on the utilization of hybrid learning approach for effective STEM teaching?

### **Method**

The research employed a descriptive survey design to gather factual, attitudinal, and behavioural information from 260 selected science teachers in Bassa, Plateau state, during the 2023/2024 session. This approach aligns with Kpolovie's recommendation for obtaining comprehensive insights into participants' awareness, utilization, and challenges related to hybrid learning in STEM education. The study encompassed 1332 Basic Science, Biology, Chemistry, Physics, and Mathematics teachers, with a sample size of 260 science teachers chosen through simple random sampling from 10 selected public secondary schools in Bassa. The research instrument, the Awareness Questionnaire for Science Teachers (AQST), comprised demographic information (Part A) and three sections in Part B: Assessing level of awareness (Section A), utilization (Section B), and challenges (Section C) related to hybrid learning in STEM teaching. Face and content validiting was done by experts in measurement and evaluation, and science education, along with a reliable Spearman Brown correlation coefficient of 0.82, affirmed the instrument's validity and reliability. Ethical considerations include obtaining informed consent, ensuring anonymity, and maintaining confidentiality. The distribution of 260 questionnaires to science teachers in selected schools followed the researchers' acquisition of permission from school principals. Data analysis involves calculating mean and standard deviation. Response categories are defined as strongly agree (3.50 to 4.00), agree (2.50 to 3.44), disagree (1.50 to 2.44), and strongly disagree (0.50 to 1.44). The study aimed to contribute valuable insights into science teachers' awareness, utilization, and challenges associated with hybrid learning in STEM education. Future research suggestions include expanding the study to encompass private schools and exploring additional factors influencing the effectiveness of hybrid learning in STEM education. This research endeavours to enhance STEM education teaching strategies in the region.

### **Results**

**Research Question 1:** What is the sciecnce teachers level of awareness of hybrid teaching/learning approach for effective STEM teaching?

Table 1: Responses of Teachers on The Level Of Awareness Of Hybrid Learning Approach

S/N	Item Statement	Number of respondents	Mean	Standard Deviation	Decision
1	Online driver	260	1.91	0.93	Disagree
2	Flex	260	1.91	0.93	Disagree
3	Station Rotation	260	1.88	0.89	Disagree
4	Enriched Virtual	260	1.92	0.94	Disagree
5	Face to Face driver	260	1.43	0.50	Strongly Disagree
6	Flipped classroom	260	1.91	0.93	Disagree
7	Self-blend	260	1.92	0.94	Disagree
8	Individual rotation	260	1.90	0.92	Disagree
9	A La Carte	260	1.90	0.91	Disagree
10	Lab rotation	260	1.65	0.74	Disagree

In table 1, the mean and standard deviation scores of the respondents revealed that science teachers in Bassa are not aware of different hybrid learning models for effective stem teaching.

**Research Question 2:** What is science teachers' level of utilization of hybrid learning approach for effective STEM teaching?

Table 2: Responses of Teachers on Level of Utilization of Hybrid Learning Approach for Effective STEM Teaching.

S/N	Item Statement	Number of respondents	Mean	Standard Deviation	Decision
1	Online driver	260	1.90	0.92	Disagree
2	Flex	260	1.92	0.94	Disagree
3	Station Rotation	260	1.88	0.89	Disagree
4	Enriched Virtual	260	1.90	0.92	Disagree
5	Face to Face driver	260	1.44	0.50	Strongly Disagree
6	Flipped classroom	260	1.41	0.51	Strongly Disagree
7	Self-blend	260	1.93	0.95	Disagree
8	Individual rotation	260	1.44	0.50	Strongly Disagree
9	A La Carte	260	1.91	0.93	Disagree
10	Lab rotation	260	1.91	0.93	Disagree

Table 2 revealed mean and standard deviation scores of science teachers in Bassa, Plateau state do not utilize hybrid learning approach for effective STEM teaching.

**Research Question 3.** What are the challenges of science teachers on the utilization of hybrid learning approach for effective STEM teaching?

**Table 3: Responses of Teachers on Challenges of Utilization of Hybrid Learning**

S/ N	Item Statement	Number of respondent s	Mean	Standard Deviation	Decision
1	Computers are available in my school for the effective STEM teaching	260	1.92	0.94	Disagree
2	I have interest in adopting new strategies for effective STEM teaching	260	1.91	0.93	Disagree
3	We have adequate computer skilled personnell in my school to help effective STEM teaching	260	1.90	0.92	Disagree
4	We have functional micro projectors in my school for effective STEM teaching	260	1.43	0.51	Strongly Disagree
5	Crowded classroom is not a barrier for effective STEM teaching	260	1.92	0.94	Disagree
6	Computer disck are available in my school for effective STEM teaching	260	1.90	0.92	Disagree
7	Computer software programmers are available in my school for effective STEM teaching	260	1.92	0.94	Disagree
8	Regular power supply are available in my school for effective STEM teaching	260	1.43	0.51	Strongly Disagree
9	Internet facilities are available in my school for effective STEM teaching	260	1.44	0.50	Strongly Disagree
10	We have a functional ICT laboratory in my school for effective STEM teaching	260	1.90	0.92	Disagree

Table 3 revealed that all science teacjers in Bassa, Plateau state are faced with the above challenges in the utilization of hybrid approach for effective STEM teaching.

### Discussion of Results

The findings, as presented in Table 1, suggested that science teachers in Bassa have a limited awareness of various hybrid learning models. The mean and standard deviation scores indicated disagree generally with statements related to hybrid learning models. This lack of awareness may stem from factors such as limited exposure to training and professional development in modern teaching methods, as highlighted by Udoh (2015). The observed low scores indicate a critical need for initiatives to enhance science teachers' awareness of hybrid learning approaches for effective STEM teaching.

Table 2 revealed that science teachers in Bassa exhibited low utilization of the hybrid learning approach. Similar to the awareness findings, the mean and standard deviation scores suggested disagree with statements related to the utilization of hybrid learning. The resistance to adopting new strategies, as indicated by previous research (Langford, 2007), and infrastructural limitations, including inadequate computer facilities and power supply challenges, likely contribute to lack of utilization.

Table 3 highlighted the challenges faced by science teachers in utilizing the hybrid learning approach. The mean and standard deviation score showed disagree with statements related to the availability of essential resources such as functional micro projectors, regular power supply, and internet facilities. These challenges aligned with the barriers identified by Ndirika (2015) including infrastructural limitations, resistance to change, and overcrowded classrooms. The absence of essential resources may hinder the effective implementation of hybrid learning in science classrooms. The findings underscore the urgent need for targeted interventions to enhance science teachers' awareness and utilization of hybrid learning approaches. Professional development programme, pre-service and in-service training, and seminars on ICT skill application should be prioritized to equip teachers with the necessary knowledge and skills. Additionally, investments in ICT resources, such as functional computers, micro projectors, and reliable power supply, are crucial to overcoming infrastructural challenges.

### **CONCLUSION**

In conclusion, addressing the identified challenges and fostering a positive shift in science teachers' attitudes towards hybrid learning will contribute to the improvement of STEM education in Nigeria. The results uncovered a lack of awareness among science teachers about the hybrid learning approach, leading to its underutilization. Additionally, the study identified challenges hindering science teachers from effectively implementing hybrid learning.

### **RECOMMENDATIONS**

The following recommendations are made based on the results of the findings:

1. Science teachers should not show non-challant attitude when it comes to embracing modern computer-driven methods of teaching since they are to locate the resources and guide learners in the learning process to meet up with the international world.
2. The State Government as well as other stake holders in secondary education should invest in the procurement and installation of modern ICT hybrid resources in secondary schools for teaching of science concepts as some of the resources are not present.
3. Government should improve the quality of science teachers by exposing them to pre-service, in-service teachers training in form of seminars on ICT skill application and re-structuring teacher education programmes to incorporate required skills especially hybrid learning approach in computer operations.

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