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## SCIENCE TEACHERS' LEVEL OF AWARENESS AND UTILIZATION OF BLENDED LEARNING APPROACH FOR EFFECTIVE STEM TEACHING IN UYO MUNICIPALITY, AKWA IBOM STATE

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### Abstract

*This study investigated the level of awareness and utilization of blended learning approach for effective STEM teaching by science teachers in Uyo municipality of Akwa Ibom State. The study adopted the descriptive survey research design. It was conducted in Uyo Local Government Area. From the population of 332 science teachers, a sample size of 260 teachers was drawn using simple random sampling technique from Uyo Local Education Committee. Instrument used for data collection was researchers' developed 30-item questionnaire on Science teachers' levels of awareness, utilization and challenges of blended learning approach for effective STEM teaching. The instrument was validated by scrutiny of experts. Spearman Brown correlation coefficient was used to determine its reliability which give a coefficient of 0.82. The data were analyzed using mean and standard deviation. The findings revealed that science teachers are not aware of blended learning approach, hence, they do not utilize the blended learning approach. Again, science teachers are faced with challenges in the utilization of blended learning approach. Based on the findings, it was recommended among others, that science teachers should avoid 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 standard.*

### Introduction

The role of new technological teaching strategies in learning is becoming one of the most important and widely discussed issues in contemporary education policy and experts in the field of education are of the opinion that when new technological teaching strategies are properly used, it holds great promise to improve teaching and learning in addition to shaping workforce opportunities (Udoh, 2015). To enhance the quality of teaching and learning in the classroom, the traditional teaching approaches which are teacher-centered and may not provide students with valuable skills or even with a body of knowledge that lasts much beyond the classroom must be discouraged maximally. According to Ndirika (2015), traditional teaching methods through assessment techniques are not effective and science teachers should utilize new teaching strategies in the classroom which are interactive such as cooperative, collaborative, problem-based learning, blended learning approach to mention but a few. With these, science teachers are expected to stay-up-to-date on the latest research and implements new teaching methods in an effort to be more effective in the classrooms. Recent researches offer new evidences that blended learning teaching approach is a great way to increase student learning and impact their ability to be successful in the future (Graham, 2006).

Blended learning is an approach to teaching in which students do part of their coursework in class and part of it online and it makes learning more interesting and accessible for all students. It is a form of education where students receive face to face instruction from a teacher and then instruction from an online component. Rothrauff (2011) defined blended learning as the combination of two different education models, traditional face to face learning and distance learning. Graham (2006) defined it as integrating face to face learning and electronic learning or distance learning, using difference learning theories.

methodologies and techniques in the same place and supporting the learning with various online technologies during the learning process. Blended learning allows teachers to use a combination of digital instruction and one-on-one face time to improve efficiency in the classroom. When students use new technological strategies to work, it improves their comprehension of new concepts, teachers can use the additional class time to give struggling students the individualized attention that they need and can now streamline their instruction to help all students reach their full potentials and to succeed. There are several blended learning models for science teacher's utilization to improve the education of his students such as model rotation, flex, self-blend, online driver and face-to-face driver just to mention but a few.

The concept of awareness by science teachers on new technological teaching strategies has received increasing attention over the past years. Although many awareness interfaces have been designed and studied, one may say that science teachers have not been aware and they do not utilize the numerous technological teaching strategies through research information on improvement of teaching and learning processes. This is seen in the persistence decline in the performance of science students in external examinations (Rothrauff, 2011). Rossett (2013) attributed this poor performance of students to factors like poor scientific background of the science teachers, lack of scientific equipment, incompetence of science teachers among others.

Utilization of blended learning approach takes cognizance of students' poor attitude and poor performances. Rothrauff (2011) opined that science teachers do not utilize blended learning in the teaching- learning processes. Langford (2007) observed that for effective teaching to be promoted the teacher has a major role to play and their role is to translate the new methodological elements into their teaching-learning processes. However, Abimbade (2005) posited that infrastructural access to connectivity and lack of adequate funding are barriers to the use of new teaching technologies by teachers and education practitioners. Queen (2012) observed that the use of ICT in education results in increased effectiveness of educational process and the use of ICT in training results in increased productivity through enhanced human capacity. This will enhance the acquisition of the basic knowledge and skills for economic and educational development since according to Runi and Bitiyak (2004), the productive capacity of a nation depends on the quality and competence of its teachers.

Although the benefit of utilizing the blended learning teaching approach in science teaching is enormous, venturing into it without proper planning and considerations may amount to sheer waste of time. According to Ndirika (2015), a typical Nigerian public secondary school presents the utilization of the blended learning approach as a mere mirage. Some of the reasons include; lack of expertise by teachers, lack of interest in adapting to new strategies, outdated facilities, power supply challenges and crowded classrooms. Most schools lack adequate infrastructure to venture into blended learning, some schools may not have adequately equipped computer laboratories with sufficient numbers of computers and the few available ones may not be in functioning states due to neglect. Evidence from previous researches also show that many secondary schools science teachers are not computer or technology literate (Udoh, Ohajua and Ado, 2015). Moreover, a lot of science teachers may just consider the issue of blended learning as time wasting due to the pressure of overloaded syllabus and expectations from administrators and external examination bodies. As a result, science teachers stick to the method they have devised over the years to cover the syllabus without having considered of whether meaningful learning is being accomplished.

Again according to Udoh (2015), most science teachers are not exposed 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 in computer operations. The State Government as well as other stake holders in secondary education should invest in the procurement and installation of modern ICT resources in secondary schools for teaching of science concepts as some of the resources are not present in Nigerian secondary schools. Udoh (2015) also opined that 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 standard hence, the attempt by this study to investigate the awareness and utilization of blended learning approach for effective STEM teaching by science teachers in Uyo municipality of Akwa Ibom State.

### **Statement of Problem**

In spite of the importance and popularity of science subjects among Nigerian students, academic performance at public senior secondary schools examinations has not improved, (Udoh, 2015). The desire to know the causes of the poor performances in science subjects has been the focus of researchers for some time now. It has been observed that one of the causes of poor performances in science subjects are caused by lack of use of new technological teaching strategies in learning (Rojewski, 2010). Students also perform poorly in sciences because the science classes are boring, usually too large and in addition, the laboratories are ill-equipped (Ikitde and Udoh, 2015). Since benefits of new technological teaching strategies in learning cannot be underestimated in the contemporary world, there are now several packages for teaching science subjects such as blended learning.

It is obvious that the current trend in research all over the world is the use of computer facilities and resources to enhance students' learning. With the deterioration in students' learning outcome in science subjects resulting in high failure rate, it is therefore important to adopt science and technology as the bedrock of national development and so investigate the awareness and utilization of blended learning approach for effective STEM teaching by science teachers in Uyo municipality of Akwa Ibom State.

### **Purpose of the Study**

The purpose of this study was to determine the level of awareness, utilization and challenges of blended learning approach for effective STEM teaching by science teachers in Uyo municipality.

The study sought to:

1. Determine science teachers' levels of awareness of blended learning approach for effective STEM teaching
2. Determine science teachers' levels of utilization
3. of blended learning approach for effective STEM teaching
4. Determine the challenges of science teachers' utilization of blended learning approach for effective STEM teaching

### **Research Questions**

The study was guided by the following research questions

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

### **Research Methods**

The study adopted the descriptive survey design. According to Kpolovie (2010), descriptive survey design is appropriate for obtaining factual, attitudinal or behavioral information from selected samples. The population of the study was three hundred and thirty two (332) Biology, Chemistry, Physics, Mathematics and Basic science teachers in Uyo local education committee of Akwa Ibom State for 2016/2017 session. The sample of the study was two hundred and sixty (260) science teachers in ten (10) selected public secondary schools in the study area using simple random sampling technique.

An awareness questionnaire, Science Teachers Awareness Questionnaire (STAQ) was developed and used for the study. The questionnaire had two parts; Part A and Part B. Part A consisted of demographic information (school, sex, experience) Part B consisted of three sections. Section A was on science teachers' levels of awareness on blended learning approach for effective STEM teaching with ten (10) items, section B was on science teachers' levels of utilization of blended learning approach for effective STEM teaching with ten items(10) while section C was on challenges of science teachers' utilization of blended learning approach for effective STEM teaching also with ten (10) items.

The instrument was face and content validated by one measurement and evaluation expert and two experts in science education and their corrections were incorporated into the final form of the instrument before administration. The instrument was trial tested on 70 science teachers who were not part of the study but had all qualities of the population of the study. Spearman Brown correlation coefficient was used to determine the reliability, with 0.82 co-efficient. This was considered reliable for the study. The researchers obtained permission from the principals of the selected schools and distributed the questionnaire to the science teachers in each of the schools. Two hundred and sixty (260) copies of questionnaire were retrieved from the science teachers out of two hundred and sixty nine(269) given out and the data were analyzed using mean and standard deviation. Mean response of 3.50 to 4.00 was considered as strongly agree, 2.50 to 3.44 was considered as agree, 1.50 to 2.44 was considered as disagree while 0.50 to 1.44 was considered as strongly disagree.

## Results

**Research Question One:** What is the science teachers' level of awareness of blended learning approach for effective STEM teaching?

Table 1: Mean and Standard deviation scores of respondents of science teachers' levels of awareness of blended learning approach for effective STEM teaching.

Distribution table of respondents on the level of awareness of Blended learning

S/N	Item Statement	Number of Respondents	Mean	Standard Deviation	Decision
	As a science teacher, I am aware of the following blended learning models for effective STEM teaching				
1	Face-to-face driver	260	1.43	0.50	Strongly Disagree
2	Lab Rotation	260	1.65	0.74	Disagree
3	Station Rotation.	260	1.88	0.89	Disagree
4	Self-blend	260	1.92	0.94	Disagree
5	Online driver	260	1.90	0.92	Disagree
6	Flipped Classroom.	260	1.91	0.93	Disagree
7	Enriched Virtual.	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	Flex	260	1.91	0.93	Disagree

In table 1, the mean and standard deviation scores of the respondents revealed that science teachers in Uyo municipality are not aware of different blended learning models approaches for effective STEM teaching.

**Research Question Two:** What is the science teachers' level of utilization of blended learning approach for effective STEM teaching?



Distribution table of respondents on the level of utilization of Blended learning

S/N	Item Statement	Number of Respondents	Mean	Standard Deviation	Decision
	As a science teacher, I utilize of the following blended learning models for effective STEM teaching				
1	Face-to-face driver	260	1.44	0.50	Strongly Disagree
2	Lab Rotation	260	1.91	0.93	Disagree
3	Flex	260	1.44	0.50	Strongly Disagree
4	Self-blend	260	1.93	0.95	Disagree
5	Online driver	260	1.90	0.92	Disagree
6	Flipped Classroom.	260	1.41	0.51	Strongly Disagree
7	Enriched Virtual.	260	1.90	0.92	Disagree
8	Individual Rotation.	260	1.44	0.50	Strongly Disagree
9	A La Carte.	260	1.91	0.93	Disagree
10	Flex	260	1.92	0.94	Disagree

Table 2 revealed mean and standard deviation scores of science teachers' levels of utilization of blended learning approach and showed that science teachers in Uyo municipality do not utilize blended learning approach for effective STEM teaching.

**Research Question Three:** What are the challenges of science teachers on the utilization of blended learning approach for effective STEM teaching?

Distribution table of respondents on challenges of utilization of Blended learning

S/N	Item statement	Number of Respondents	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 adapting new strategies for effective STEM teaching	260	1.91	0.93	Disagree
3	We have adequate computer skilled personnel in my school to help in 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 to effective STEM teaching	260	1.92	0.94	Disagree
6	Computer Discs are available in my school for the effective STEM teaching	260	1.90	0.92	Disagree
7	Computer soft ware programmes 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
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Table 3 revealed that all science teachers in Uyo municipality are faced with above challenges in the utilization of blended learning approach for effective STEM teaching.

### Discussion of Results

The results of this study from table 1 showed that science teachers are not aware of the blended teaching strategy in public secondary schools in Uyo municipality. It then means that science students on graduation are not exposed to this innovative teaching strategy and this is not commendable since it will not solve the problem of poor external examinations. The implication of these findings is that science teaching and learning shall remain didactic and teacher centered. These study is related to Rossett(2013)which stated that research findings in science education are often buried in research journals where the published.(Rothrauff, 2011)said that science teachers are not aware of the numerous technological teaching strategies through research information on improvement of teaching and learning processes. This is seen in the persistence decline in the performance of science students in external examinations. Maredia (2007) corroborates that focusing on imparting skills and abilities that are transferable to a wide range of occupations will influence the desired characteristics expected of the curriculum and these will improve poor academic performances of science students.

Findings from table 2 showed and also confirmed that the view of the respondents were unanimous on non-utilization of blended learning approach for effective STEM teaching. This finding corroborated with the findings of Rothrauff (2011), that science teachers do not utilize the numerous technological teaching strategies through research information on improvement of teaching and learning processes. Runi and Bitiyak (2004) said that the productive capacity of a nation depends on the quality and competence of its teachers. Langford (2007) observed that for effective science teaching to be promoted, science teachers have a major role to play and good attributes must be acquired which include teacher's quality, teachers' confidence in his ability to teach, teachers interest in expanding his knowledge and that of his students in a manner that each student is inspired to attain. Queen (2012) observed that the use of new technological facilities in education results in increased effectiveness of educational process and results in increased productivity through enhanced human capacity. This will enhance the acquisition of the basic knowledge and skills for economic and educational development.

Table 3 revealed that science teachers are faced with several challenges in the utilization of blended learning approach for effective STEM teaching. This corroborated with the findings of Abimbade (2005) that infrastructural access to connectivity, infrastructural facilities and lack of adequate funding are barriers to the use of new teaching technologies by teachers and education practitioners. Ndirika (2015) said that a typical Nigerian public secondary school presents the utilization of the blended learning approach as a mere mirage because of lack of expertise by teachers, lack of interest in adapting to new strategies, outdated facilities, power supply challenges and crowded classrooms. Most schools lack adequate infrastructure to venture into blended learning, most schools do not have adequately equipped computer laboratories with sufficient numbers of computers and the few available ones are not in functioning states due to neglect(Ikitde & Udoh, 2015). Udoh, Ohajua and Ado, (2015) added that many secondary schools science teachers are not computer or technology literate. Udoh (2015) opined that science teachers in educational institutions should be granted in-service training to acquire more knowledge and skills, which can help them to impact positively on students. Government should also organize seminars, workshops and conferences for science teachers so that they can be taught the new technological strategies in science teaching.

### Summary of Findings

The summaries of findings from this study are as follows:

1. Science teachers are not aware of blended learning models approaches for effective STEM teaching.
2. Science teachers do not utilize blended learning models approaches for effective STEM teaching and
3. They are faced with challenges in the utilization of blended learning models approaches for effective STEM teaching.

### Conclusion

The world has become a global village and world educational system has undergone tremendous changes and Nigeria educational system should not lack behind. If Information and Communications Technology and its use in teaching and learning activities make teaching and learning enjoyable, science teachers should be willing and their computer skill applications should be improved through seminars, workshops and conferences to enable science teachers in Uyo Local Government Area of Akwa Ibom State utilize new technological strategies in the schools for science curriculum delivery.

### 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 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 in computer operations.

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