Impact of Flipped Hybrid Learning Model on Academic Retention of Senior Secondary Students in Physics in Akwa ibom North-West Senatorial District

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Abstract—The study examines the impacts of flipped hybrid learning model on retention of concept learnt in physics among senior secondary two students (SS II) in Physics in Akwa Ibom North -West Senatorial District. A quasi experimental pre-test post-test non-randomised control group design was adopted for the study. Two research questions and two null hypotheses were formulated to guide the study. Physics Achievement Test instrument was used for data collection from sample size of 184 students. The instrument was validated by three content and media design experts. A reliability of 0.73 was obtained with split half method using Pearson Product Moment Correlation, which was converted using Spearman Brown formula to have reliability co-efficient of 0.84. Mean and Standard Deviation were used in answering all the research questions and Analysis of Covariant was used for testing all the hypotheses at 0.05 significant level. The results obtained shows that the use of flipped hybrid learning model enhanced students' academic retention in physics, since students taught with the model did better. The study also shows that male students taught with flipped hybrid learning model had greater mean retention scores than female students taught with the model. Hence it is concluded that the use of flipped hybrid learning model enhanced students' academic retention. Based on this findings, it is recommended that teachers, educational administrators and Curriculum designers should adopt flipped hybrid learning model to enhance students academic retention.

Keywords— Flipped, Hybrid, Learning, Physics, Retention

I. INTRODUCTION

Education is an instrument par- excellence and the foundation of human development. It is the bedrock of knowledge society; hence no society can develop more than its educational system [1]. It is a fact that senior secondary school students' academic performance is not very encouraging in external examination due to poor performances especially in physics in the study area. One of the challenges students face in classroom today is lack of motivation, especially in physics due to boredom associated with the traditional teaching method. Hence there is therefore need to adopt a more flexible teaching method to motivate the learners. The aim of teaching and learning is to ensure effective classroom communication which involves proper identification, assembly and application of technological principles to facilitate change in behaviour and performance. Technology is really changing the modern day educational industry. Nwobi believes that the wind of globalisation and technological changes witnessed over the past few decades now has created new global economy [2]. Since the society today is technology-driven, men and women alike have adopted technology into their daily affairs. Technology has permeated the society to the extent that in virtually every

field of endeavour, there is one form of role or the other which technology can play and thus technology has brought in so many innovations in all fields of life, such as the banking sectors. The educational sector is not left out as technology has also made impact in it. Hence the researcher utilises flexible teaching method known as flipped hybrid learning model with Facebook platform to demonstrate this fact. This is done in order to motivate students for greater retention. The researcher also compares the academic retention of students in physics taught with flipped hybrid learning model based on gender in Akwa Ibom North- West.

Flipped hybrid learning is an approach whereby students watch video, read an article, and get preview assignment that is done online at home, then when meeting in classroom, they are engaged in guided practice, or do small group intervention instruction [3]. In traditional classroom, students are given assignment at the end of the lesson, but in Flipped hybrid learning model, the class is inverted, assignment is given inform of pre-test questions to be answered remotely at home before on site meeting, the assignment given to students could be questions on lower cognitive level while the questions on higher cognitive level are treated in class meeting, unlike the traditional

class setting. Hence, the researcher views flipped hybrid learning model as the combination of the traditional face to face classroom learning and online remote learning in an inverted classroom.

II. STATEMENT OF THE PROBLEM

There are many factors contributing to students' poor academic retention of learned content, some of these may include the choice of methods that matches learners need and topic, and lack of motivation. The nature of motivation and learning strategy used is vital to improving student learning retention. The effectiveness of an instructional method is reflected in the outcome of the teaching-learning process in form of marks, grades and mean scores. The most important indicators of the effectiveness of teaching can be academic retention of learners, which can be influenced by different factors such as individual motivations. Physics is a requirement for students that intend to study science related programmes such as engineering and medicine in tertiary institutions. These programmes are avoided by students because of physics due to its perceived abstract nature. Most students that offer physics in the study area performed poorly due to lack of motivation. Senior secondary school certificate examination results obtained from schools in the study area from 2017 to 2020 show low performances in physics, hence the researcher traced this failure in physics in the study area to teaching method adopted by physics teachers. Therefore, this study adopts an innovative and flexible method known as flipped hybrid learning model in order to improve academic retention of contents learnt by the students in Physics in the study area. Rest of the paper are organised as follows; purpose of the study, significance, research questions and hypotheses, methodology, findings, conclusion and recommendation.

The theoretical framework of this study is based on connectivism by George Siemens (2004). According to George Siemens, Connectivism is a learning theory for the Digital Age. In Connectivism, learning is a process that occurs based on a variety of continuously shifting elements. The starting point of learning is the individual who feeds information into the network, which feeds information back to individuals who in turn feed information back into the network as part of a cycle. Because there is so much information available in the connected network and the information is changing rapidly, it is very important for an individual to be able to filter content to determine which information is valuable to the user. Not only does the individual have to filter content, but also the belief that the new information can change thinking so that future decisions are based on the latest information. It is relevant to this study because connectivism admits that students can learn from devices for example Facebook and that decision-making is itself a learning process.

III. PURPOSE OF THE STUDY

1. to determine if there is any difference in mean retention scores of students in senior secondary two (SS II) taught

Physics with flipped hybrid learning model and those taught with expository method.
2. to find out if there is any difference in the mean retention scores of male and female students in SS II taught Physics with flipped hybrid learning model.

IV. SIGNIFICANCE OF THE STUDY

The findings of this study would be beneficial to teachers, students, educational administrators, curriculum planners and designers, instructional developers, stake holders in the country and ministry of education.

V. RESEARCH QUESTIONS

1. What is the difference in mean retention scores of SS II students in Physics taught with flipped hybrid learning model and those taught with expository method?
2. What is the different in mean retention scores of male and female SS II students in Physics taught with flipped hybrid learning model?

IV RESEARCH HYPOTHESES

H01: The mean retention scores of SS II students in Physics taught with flipped Hybrid learning model and those taught with expository method do not differ signifantly.
H02: The mean retention scores of male and female SS II students in Physics taught with flipped hybrid learning model do not differ significantly.

VI. RELATED WORK

A study by Sirakaya revealed that there was a significant difference between group taught with flipped classroom and those taught with conventional method in terms of academic achievement, motivation and retention [4]. Elkhatat opined that learning outcomes are achieved effectively using the hybrid online-flipped learning pedagogy, which can be considered for computerized traditional laboratories as a moderation solution to alleviate pandemic COVID-19 confinement on learning outcome [5].

A Study on the impact of learning styles on the perception of hybrid Learning shows students positive perception of hybrid learning and there exists an insignificant statistical correlation between learning styles and the perception of the hybrid learning [6]. A study that investigated the effectiveness of a flipped class by examining students' academic performance, course content coverage, retention of courses by students and students' perception of flipped classes, found an improved student performance, improved course retention, and positive student perception, with minimal loss of content [7].

An investigation by Bachelor to determine if the flipped model can be combined with hybrid learning as to create the flipped-hybrid classroom to improve language, shows

that flipped- hybrid technique is a viable alternative to the traditional classroom, it provides students with additional opportunities to use the language in authentic situations, and encourages more spontaneous language use [8]. A study that investigated the effect of blended(hybrid) learning on the retention of Physics content by students in Federal Colleges of Education in South East, Nigeria, found that blended(hybrid) learning increased the retention of Physics content by students, it also revealed that retention of Physics contents by the students were not dependent upon their gender. The researcher, therefore among other things recommended that blended learning should be made a compulsory teaching strategy for Colleges of Education [9].

A result of an investigation to assess effectiveness of blended(hybrid) teaching based on flipped classroom in terms of student satisfaction and performance indicated that students were highly satisfied with the hybrid environment and the flipped classroom methodology. Moreover, the studies taught in this type of classrooms yielded better success rates and improved retention as compared to fully online teaching [10] .

Facebook, which is the platform for the online aspect of flipped hybrid instruction is a social networking site that makes it easy for you to connect and share with family and friends online. It was originally designed for college students, created in 2004 by Mark Zuckerberg while at Harvard University. A study that examined the impact of educational use of Facebook by high school students found Facebook group to be effective on issues such as development of writing abilities of students, communication and cooperation between teacher and students, cooperation and communication among students [11].

This paper investigates the effect of flipped hybrid learning model and academic retention. Therefore, retention of learned information can be defined as having the information stored in long-term memory in such a way that it can be readily retrieved, for example, in response to standard prompts [12]. The study of retention clearly overlaps with the study of memory, but differs in that for information to be viewed as retained, students must be able to recall it when appropriate, in response to prompts such as those usually found in schools and not merely in response to experiential cues.

This study also investigates academic retention with flipped hybrid model based on gender. Concept of gender includes the expectations held about the characteristics, aptitudes and likely behaviour of both women and men. Gender is the range of characteristics pertaining to, and differentiating between, femininity and masculinity. A study by Ogundola, which was aimed to determine academic retention of students based on gender, found no significant difference in the mean interest and retention scores of students based on gender but found significant difference in the mean interest and retention scores of

students based on gender [13]. Edoho found no significant difference between the mean achievement scores of male and female students in geometry taught using collaborative concept mapping instructional strategy and those taught using discussion methods [14].

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VII. METHODOLOGY

Research Design
This study adopts a quasi- experimental pre-test post-test non randomised control group design. This design was considered suitable since intact class setting was used to observe the effect of treatment on students' academic achievement. Experimental design allows for the control of relevant variables on the subject.

Sample Size
A total of 184 respondents from a population 3691 students formed the sample size of the study, which comprises 88 male and 96 female.

Sampling Techniques
Purposive sampling technique was used in selecting schools from the target population based on certain criteria. Six urban and four rural schools were suitable for the study. Simple random sample technique of balloting was used to select four schools (two in urban and two in rural areas). Four intact classes were used in the schools selected. Urban and rural schools had experimental and control groups.

Research Instrument
A Physics Achievement Test (PAT) was used for data collection. PAT contained 25 multiple-choice items which covers displacement, speed, velocity and acceleration. The instrument was validated with face and content validation methods by giving copies of PAT to physics teacher and an expert in test and measurement to validated the items. To determine the reliability of the instrument, the instrument

was administered to 30 students who were not part of the process, and a split-half method was used to establish the reliability of the instrument. The data collected was analysed using Pearson products moment correlation and it yielded a coefficient of 0.73. The r-value was subjected to Spearman-Brown test which yielded a coefficient of 0.84, signifying high reliability.

Data Collection Procedure

The Physics Achievement Test instrument (PAT) was administered to the respondent in the two groups (experimental and control) through research assistants in their various schools as pre-test before the experimental procedure and the students were post-tested after the treatment.

Data Analysis

Mean and standard deviation were used in answering the research questions while analysis of covariance (ANCOVA) was used in testing the hypotheses at 0.05 level of significance.

VII. RESULTS AND DISCUSSION

Table 1 shows mean and standard deviation of pre-test and retention scores of treatment and control groups.

Table .1

Group	N	Pre-test X	Sd	Retention Score X	Sd	Mean gain	mean diff.
Treatment	91	44.75	16.19	69.80	27.90	25.05	
							13.03
Control	93	41.96	17.68	53.98	14.31	12.02	

N-184

Table 1 shows that pre-test mean scores of Students taught with flipped hybrid learning model and with expository method are 44.75 and 41.96 respectively. While the retention scores are 69.80 and 53.98 respectively

Table 2 shows mean and standard deviation of pre-test and retention scores of male and female groups.

Table 2

Group	N	Pre-test X	Sd	Retention Score X	Sd	Mean gain	mean diff.
Male	50	45.80	13.96	78.80	26.97	33.00	
							14.03
Female	41	39.61	20.05	58.44	26.10	18.83	

N-91

Table 2 shows that pre-test mean scores of male and female Students taught with flipped hybrid learning model are 45.80 and 39.61 respectively. While the retention scores are 78.80 and 58.44 respectively.

Table 3 shows (ANCOVA) result of pre-test and retention scores of treatment and control groups.

Table 3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Square
CORRECTED MODEL	49167.010	2	24583.505	86.808	.000	.490
Intercept	16753.793	1	52697.580	59.160	.000	.246
Pre	37650.450	1	37650.450	132.950	.000	.423
Group	8333.580	1	8333.580	29.427	.000	.140
Error	51257.947	181	283.193			
Total	803264.000	184				
Corrected Total	100424.957	183				

a. R Squared = .490 (Adjusted R Squared = .474)

Table 4 shows (ANCOVA) result of pre-test and retention scores of male and female groups.

Table 4

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Square
Corrected Model	9348.147	2	4674.074	6.540	.002	.129
Intercept	52697.580	1	52697.580	73.737	.000	.456
Pre	8.948	1	8.948	.013	.911	.000
Group	8932.725	1	8932.725	12.499	.001	.124
Error	62891.149	88	714.672			
Total	488412.000	91				
Corrected Total	72239.297	90				

a. R Squared = .129 (Adjusted R Squared = .110)

VIII. CONCLUSION AND FUTURE SCOPE

The purpose of this study was to find out the impact of flipped hybrid learning model on secondary school students' academic retention in physics. It is therefore concluded as follows:

The use of flipped hybrid learning model enhanced SS II students' academic retention in physics as shown in table 1 and 3.
The use of flipped hybrid learning model improved academic retention of male students more than their female counterpart in Akwa Ibom North-West as shown on table 2 and 4.

The use of flipped hybrid learning model enhanced academic achievement and retention of senior secondary two students in physics in Akwa Ibom North-West Senatorial District. The study showed that the use of flexible and engaging instructional strategies like flipped hybrid model can actually enhanced the mean retention scores of low cognitive ability students more than the high cognitive ability students. The investigations further show that the combination of different teaching strategies like flipped classroom and hybrid learning can improve students' academic achievement and retention in any subject. Since flipped hybrid model is the combination of onsite and online learning strategies which reduced seat time in classroom and traffic on campus, then it would help in overserving Covid-19 protocols among students.

Based on the findings and conclusion drawn, the following recommendations are made:

1.Teachers should adopt flipped hybrid learning model to improve students' academic achievement and retention, because the use of flipped hybrid learning also enhances students' motivation.

2. Educational administrators should make available modern facilities like internet services and computer sets to facilitate innovative instructional strategies such as flipped hybrid learning.

3. Government should encourage the use of flexible teaching strategies such as flipped

 hybrid learning model so as to reduce seat time in classrooms during this pandemic period.

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