INFLUENCE OF SELF-EFFICACY ON SECONDARY SCHOOL STUDENTS' INTEREST AND ACADEMIC ACHIEVEMENT IN PHYSICS IN CALABAR EDUCATION ZONE, NIGERIA.

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Abstract

The study investigated the Influence of self-efficacy on secondary school students' interest and academic achievement taught Physics concepts with flipped classroom method, in Calabar Education Zone, Nigeria. In pursuance of this purpose, two research questions and two hypotheses were formulated. The study adopted the pre-test, post-test, non-randomized quasiexperimental design. The population of the study consisted of 1,430 senior secondary two science students from four secondary schools in Calabar Education Zone of Cross River State. A sample size of 109 science students from the four intact classes, were drawn from 84 secondary schools in two local Government Area in Calabar Education Zone, using stratified random sampling and purposive sampling techniques was used. The study adopted quasi experimental, pre-test, post-test, non- randomized design. The study used three (3) instruments: Physics Achievement Test (PAT), Students' self-efficacy questionnaire (SSEQ) and Students' Interest questionnaire (SIQ) for data collection. The three instruments were validated and the reliability determined using Kuder-Richardson formula (K-R₂₀) method and Cronbach-coefficient and the calculated reliability coefficient for PAT was 0.73, self-efficacy was 0.82 and interest was 0.76. Data analyses were carried out using the one-way Analysis of Covariance (ANCOVA). All the hypotheses were tested at 0.05 level of significance. The findings showed that there is no significant influence of self-efficacy on students' interest taught physics concepts with flipped classroom method. There is no significant influence of self-efficacy on students' academic achievement taught physics concepts with flipped classroom method. Based on the findings, it was recommended that Physics teachers should be exposed to Flipped classroom through seminars or trainings to improve their inputs during teaching, and to aroused the interest of the students.

Keywords: Self efficacy; Flipped classroom method, interest; Physics; academic achievement

Introduction

Physics is the branch of natural science that deals with the behavior and properties of matter, energy and their relationship. It is sometimes referred to as the science of measurement (Sani, 2012). Physics remains the fundamental science among other science subjects, because many of the tools on which scientific and technological advancement depends on, are the direct products

of Physics. The knowledge and principles of Physics had led to sustainable development in the area of industrialization as well as improvement of the wellbeing of human race.

Apart from the general knowledge of physics principles which enhances daily living in the modern society, students are required to obtain a pass at credit level as one of the requirements, to be eligible for admission into various science courses like Mechanical Engineering, Electrical Engineering, medicine, Electrical Electronics, Pure physics and many more (Khan, Quarashi, Hussain & Hayee, 2005). In spite of the usefulness and numerous applications of Physics, academic achievement of students in physics has continued to be generally low for the past years (West African Examination Council (WAEC), 2022). National Examination Council (NECO), (2011) chief examiner also reported that core subjects (Physics inclusive) recorded mass failure. Therefore, the percentage of students' academic achievement was observed to be low.

According to Williams (2018), academic performance is often associated with students' GPA. It can also be regarded as an accomplishment of scientific achievements and skills, impressive test scores, extracurricular achievements, students' ability to lead if assigned to. Academic achievement, according to Ghanney and Aniagyei (2014), is something capable of achieving/ by students when they are tested with what has been taught. The academic performance here focuses more on intellectual capacity. According to Siqueira and GurGe-Giannetti (2011), poor academic achievement can also be interpreted as a result of school achievement below expectations. The explanation from different scholars maintained that poor academic achievement refers to something measured, but does not meet the expectations or standards of achievement.

Assefa, et al, (2008) identified lack of interest as one of the major problem that physics students are facing, because of such low levels of interest, the number of students studying sciences during their senior school years becomes few and this in turn leads to a shortage of science students in various disciplines. (Forgasz, 2006). Students' interest towards learning science subjects like physics, chemistry, Biology and Mathematics have long been a common concern among educators. Students' interest towards science has been considered an important factor influencing participation and success in the science subjects. The engagement of students in the process of learning tasks is considered higher when the learner is interested in that task. Carmichael, Hay and Watson (2010) also stated that, interest is a situation where learners become so much involved in the learning task, thereby losing all sense of time.

Self-efficacy has been observed as one of the factors that influence academic achievement of students in science, most especially physics (Ramnarain & Ramaila, 2017). The construct of self-efficacy reflects an optimistic self-belief, a belief that one can perform novel or difficult tasks, or cope with adversity in various domains of human endeavor (Bandura, 1997b). Self-efficacy is the individual's confidence on his competences to execute the level of energy required to surpass in life. Fakolade and Bamidele's (2017), also found out that, self-efficacy is a predictor of students 'interest in the subject.

Self-efficacy is a person's sureness or the capacity for execution to achieve the goals and accomplish tasks. It is actually the confidence that individual has with the help of which he can cope in different situations successfully. Self-efficacious person is one who strives to reach and achieve the goals. He operates with intelligent guesses to perform the work and derive the results and conclusion (Aamna, Irshad & Shah, 2020). High self-efficacious students fix higher goals to achieve and are able to face the complex situation compared to the pupils with low self-efficacy, as they will be unable to do the same (Ahmad & Triantoro, 2013).

Nghambi (2014)., Afriani (2020)., Adie et al (2020)., and Adie et al (2022) stated that, non-use of appropriate teaching methods, inadequate supply of teaching materials and learning processes, insufficient teacher training, inappropriate government policies and lack of care from

parents for their children are several factors causing students to have poor academic achievement.

In recent years, educational systems in many countries have experienced a tremendous and rapid change. This change is as a result of teaching and learning strategies being structurally modified, the modification leads to the development and introduction of new teaching and learning method or strategies. Some of these methods allow the instructors and learners to focus on their roles, and most strategies are student- centred while some are teacher-centred. One of such modern strategies is the Flipped Classroom Method (FCLM).

Mull (2012) defined flipped classroom method as that in which learners prepare themselves for the lesson by watching and listening to the videos via media. Clark-Ibanez and Scot (2010) defined flipped classroom method as a pedagogical approach that employs blended knowledge. It is a method where learners are provided with the contents through a video form, to be used outside the school environment or at home (Robb & Rudy, 2012). Flipped classroom method aims at making the learning and teaching processes active and thereby giving the learner opportunities to use his or her knowledge or idea in the classroom. However, flipped classroom method enables students to be acquainted with new information with the aid of different technological tools that have been prepared and distributed by teachers and other educators. For example, a teacher prepares a video that contains some physics concepts such as simple machines and electricity using Teacher Youtube or Adobe presenter. This video which may last for about 20 and 40 minutes affords students first-hand learning even before physical contact with the teacher and classmates

Theoretical background

This study is anchored on the Constructivist theory by Bruner (1966);

A major theme in Constructivist theory by Bruner is that, learning is an active process in which learners construct new ideas or concepts based on their current or past learning experiences in the new learning situations. According to Bruner (1966), learners select and transform information, construct hypotheses, and make decisions, based on their cognitive structure to do so. The basis of this theory is that, learners do not only comprehend new information, but they can use their experience with the new knowledge to make sense of the information they receive as they expand their understanding and knowledge. This theory claims that learners learn best when they are building knowledge individually and socially constructing meaning as they use their past experience to access new knowledge.

Bruner (1966) also asserted that in the classroom, teachers' role as an instructor is to present the materials to be learnt in such a way that, the learner can assimilate (Bruner, 2009). Teachers are also to engage students actively during learning and to assist them in whatever they are doing. Bruner (1966) posited that, constructing of new knowledge is achieved when students can explore a problem, attempt to solve it, and adjust to develop new solutions. Bruner (1966) states that a theory of instruction should address four major aspects:

- i Predisposition towards learning,
- ii The ways in which a body of knowledge can be structured so that it can be most readily grasped by the learner.
- iii The most effective sequences in which to present material.
- iv The nature and pacing of rewards and punishments.

Good approaches for organizing knowledge should result in simplifying, generating new propositions, and increasing the manipulation of information. The relevance of this theory in this work is that, students should be provided with video material that matches with the concept in the content. Therefore, learning is very effective when learners are given opportunity to construct their own ideas in a given learning situation. In this study, students in the classroom are treated as specific entity and given the privilege to work as individuals and as group.

Statement of the problem

Low students' interest and academic achievement of science students in secondary schools has been an unresolved issue in Calabar Education Zone and Cross River State as a whole. The academic achievement and interest had witnessed a deplorable trend in the past decade. The problem of this low interest and academic achievement of physics students had long been observed by different research studies and examination bodies like West African Examination Council (WAEC) and National Examination Council (NECO). Observations and reports from these examination bodies showed that, a high percentage of secondary school students continue to perform poorly in physics examinations. Considering the analysis of the results of the examination conducted by the WAEC in Nigeria in May/June 2018-2022, out of 24,754 candidates who sat for Physics, only 10,505(42.44%) had high grades while 14,249(57.56%) had low grade in physics. Empirical research reports indicated that, lack of self-efficacy and persistent use of the lecture method of instruction by many physics teachers in secondary schools has been identified as one of the reasons for low interest and academic achievement of science students in secondary schools over the years.

Although, various steps had been taken by government, teachers, school authority and parents in an attempt to surmount this problem, the efforts have only yielded minimal results. Therefore, the study is designed to investigate the Effect Flipped Classroom Method and self-efficacy on Secondary School Students' Interest and Academic Achievement in Physics in Calabar Education Zone, Nigeria.

Purpose of the study

The study investigated the Influence of self-efficacy on Secondary School Students' Interest and Academic Achievement taught physics concepts with flipped classroom method in Calabar Education Zone, Nigeria." Specifically, the study sought to examine:

- i. The influence of self-efficacy on interest of students taught physics concepts with Flipped Classroom Method.
- **ii.** The influence of self-efficacy on academic achievement of students taught physics concepts with Flipped Classroom Method.

Research questions

The following questions were generated to guide the study

- i. How does self-efficacy influence interest of students taught physics concepts with Flipped Classroom Method?
- ii. How does self-efficacy influence academic achievement of students taught physics concepts with Flipped Classroom Method?

Statement of hypotheses

On the basis of the research questions posed, the following null hypotheses were formulated to guide this study.

- i. There is no significant difference of self-efficacy on the mean interest scores of students taught physics concepts with flipped classroom method.
- ii. There is no significant difference of self-efficacy on the mean academic achievement scores of students taught physics concepts with flipped classroom method.

Literature Review

Students' self-efficacy and interest in science

A research conducted by Lucy, et al (2022) on self- efficacy and self-esteem as determinants of students' interest in introductory technology in Anambra State, Nigeria. Study investigated the self-esteem and self-efficacy as determinants of students' interest introductory

technology. The study adopted a factorial design. The samples of this study consist of 478 junior secondary II students (221 males, 257 females). Multi-stage sampling method was used in selecting the sample for the study. Data was collected with Interest Scale, Index of self-esteem scale and Self-efficacy scale and analyzed using 2-Way analysis of variance. The result showed that the observed mean difference in the students' interest in Introductory Technology among students with high and low self-esteem was significant. Also, the mean difference in the students' interest in Introductory Technology among students with high and low self-efficacy was significant. The findings also showed that, there is interaction effect between self-esteem and self-efficacy on students' interest in Introductory Technology. Findings imply that that self-esteem and self-efficacy impacted students' interest in introductory technology subject.

A research carried by Özyürek (2005) to determine whether there is a relationship between self-efficacy, interest and mathematics weighted majors' preferences. The study used 590 participants (109 females, 113 males), tenth (76 females, 115 males) and eleventh (90 females 87 males) grade high school students enrolled in state and private high schools in a southern city of Turkey. The instruments used in the study for data collection were, "Measurement of Information Sources of Math-Related Self-Efficacy", Math Related Self-Efficacy Measurements, Mathematics Interest Measurement and instruments for measuring math-weighted goals. Results from the findings indicated that, all sources but vicarious learning predicted self-efficacy. Also, sources had a significant indirect impact on interest through math related self-efficacy.

Bekomson, et al. (2020) found that there was association between interest in extracurricular activities and self-efficacy of senior secondary school students in Cross River State, Nigeria. Recently,

Bassi et.al (2007) conducted the study on two groups of Italian students between the age of 15-19 years one with high academic self-efficacy and one with low self-efficacy using experience sampling method (SEM) in order to find academic self-efficacy beliefs and quality of experience in learning. The study found that learners with high self-efficacy beliefs predicted successful with higher determinations in respect to low academic self-efficacy students.

Mizumoto (2012) conducted the study on 281 EFL learners from two universities in Japan by distributing them in to three groups, using vocabulary test size questionnaire and open ended questions for data collection in order to explore the impact of self-efficacy on vocabulary learning approaches. The impact was observed and the study revealed that the impact of self-efficacy was experienced in the open ended responses of learners. The study also concluded that students with high self-efficacy were energetic in using vocabulary learning strategies compare to those who have low or medium self-efficacy.

Students' self-efficacy and academic achievement in science

Kenna (2014) conducted a study using 22 students from two of his high school Physics classes, with one class receiving lecture method of instruction and the other receiving instruction via the flipped method. The flipped classroom was chosen by a coin toss at random by the researcher. The flipped instruction PowerPoint lectures were recorded via Screencast-o-matic.com in video podcast format and ranged between 10-12 minutes long. Before this study, students were given a pre-intervention self-efficacy survey. At the end of 10 weeks of instruction, the students were given a post-intervention survey to gain insight into changes in perceived self-efficacy while learning in the respective instructional methodology. At the end of eighteen weeks, students were given self-efficacy survey for the statistical analysis of the study. Kenna found that when the flipped instructional paradigm was used in his high school Physics class, students exhibited greater self-efficacy than students in the control group. The mean scores on the pre-intervention survey before the new semester started. The comparison group had a pre-intervention mean score of 22.73 and a post-intervention mean score of 22.36 with a

mean difference of - 0.37. The intervention group had a pre-intervention mean score of 23.91 and a post intervention score of 24.18 with a mean difference of 0.27. The standardized effect size, d, was .54 indicating a medium effect. No statistically significant difference was found on academic impact.

Wiginton (2013) utilized a mixed-method research design to investigate the impact of flipped instruction on self-efficacy and academic achievement in three Algebra-I classrooms. The participants in the study were 66 ninth graders. The first class incorporated active flipped learning strategies (flipped mastery), the second class uses flipped learning strategies, and the third class employed lecture learning strategies. Data were collected using Quality Core End-of-Course Assessment (Quality Core EOC). Self-efficacy was measured through a Mindfulness-Based Self Efficacy Scale (MSES-R) survey pretest and posttest that was entered into IBM SPSS Statistical software and analyzed. A MANCOVA was used to determine the impact among the three core learning environments. The results showed that students in the flipped learning strategies class scored higher than the students in the flipped mastery classroom (M =146.17, SD = 2.6) and the students in the traditional group. There was also a significant difference found in self-efficacy among students in the three learning environments as well, F (2.57) = 116.956, p < .05. Students in the flipped mastery group scored higher on the MSES-R posttest than students in the flipped learning group and students in the traditional group respectively. The results of finding showed a significant difference between the groups on the combined dependent variables, F (4,112) = 11.025, p < .0005. There was also a significant difference found from the MSES-R posttest scores for the three learning environments as well, F (2.57) = 563.142 p < .05.

A study by Taasoobshirazi and Sinatra (2011) examined the relationship between selfefficacy, course grade, and physics conceptual understanding in introductory-level college physics. Physics conceptual understanding was measured by the Force Concept Inventory and was administered twice: once on the second day of class, and again on the last day of class. The course grade was based on the two course exams. Self-reporting questionnaires were also used to measure approach goal orientation, need for cognition, and perceived self- efficacy. All the questionnaires were administered two days before the final exam. Data were collected and analyzed. The results showed a positive correlation between self-efficacy and physics conceptual understanding, as well as the student's physics grades. This showed that, students with higher self-efficacy beliefs had higher course grades and a significant increase in student learning gains in the Force Concept Inventory (FCI).

Another study conducted by Galyon, Blondin, Yaw, Nalls and Williams, (2012) examined the relationship between academic self-efficacy, student participation, and academic performance (considered as an outcome measure). Also, the researchers examined whether students' grade point average (GPA) moderated the relationship between self-efficacy, participation, and academic achievement. The sample size of 165 undergraduate students in three sections of an Educational Psychology course was used for the study. Data was collected and analysed. The result from the findings showed that, academic self-efficacy predicted class participation and exam performance.

A paper presented by Abid, Muhammad, Aaqib and Farhat (2019) on a research to examined the effects of self- efficacy on the academic performance of the students of University of the Punjab, Lahore. A quantitative research methodology was adopted in the study. Simple random sampling technique was used to select a total sample size of 180 respondents were used for the study. Interview schedule was used as instrument for data collection. The data were analysed using SPSS, and the results showed that, 42.2% of the respondents were confident to have the ability to fulfil their goals and 54.4% were confident and motivated to understand basic concepts of their subjects. For academic performance, 41.7% respondents were satisfied with their academic performance because their past results encourage them to work hard. The results of Spearman's correlation indicated that, there was a significant relationship between the self-

efficacy and academic performance of the students while studying at higher level learning. This implies that self-efficacy has significant effect on students' academic achievement.

Meera and James (2015) conducted the study on 520 secondary school student using English Language self-efficacy and performance scale in order to examine the connection between self-efficacy and academic performance in English Language. The study found that there is a crucial and influential connection between self-efficacy and academic performance in English. The study also examined the variance of self-efficacy and academic performance in English of Urban and Rural students. The study also concluded that language learners with strong self-efficacy showed well performance and accomplishment.

Ali, Wan and Nobaya (2017) conducted the study on the relationship that exit academic self-efficacy and academic achievements. The study consists of 319 college students in Nigeria who were first grouped and then randomly selected for the study. The data was collected through questionnaire form. The result of the fndings showed that (80.82%) learners hold academic self-efficacy in college and the study also revealed that an important association exist between academic self-efficacy and academic achievements (r=0.342, p<0.01).

Methodology

The study adopted the quasi-experimental pre-test, post-test, non-randomized design. This is because the study involves the manipulation of the independent variable (teaching methods) in order to determine its effect on the dependent variables. The study was conducted in Calabar Education Zone of Cross River State which is one of the three Education Zones in Cross River State, Nigeria. The population of study consisted of 1,430 senior secondary school two (SSII) physics students in Calabar Education Zone. There are 84 secondary schools in the seven Local Government Area in Calabar Education Zone, with 810 male and 620 female senior secondary school II students offering physics. The sample for the study consisted of 109 physics students; stratified random sampling technique was used to select two Local Government Areas from the seven (7) LGA in Calabar Education Zone. From the two LGAs selected, four schools out of 84 schools in Calabar education zone were selected using purposive sampling technique. The selection of the four schools was based on the following criteria: The school must have electricity, in order to power the electronic devices (Projector, and lap-top before and during the discussion class. The selected school must have up to senior secondary (SS2). All the four schools were used as experimental group. The study used three instruments: Physics Achievement Test (PAT), Students' self-efficacy questionnaire (SEQ) and Students' Interest questionnaire (SIQ) for data collection. PAT consists of sixty (60) items each with multiple choice questions and with four Options A, B, C and D. It has one correct option and three others as detractors. While Students' self-efficacy questionnaire (SEQ) and Students' Interest questionnaire (SIQ) was designed to measure students' self-efficacy and interest in physics respectively. SEQ and SIQ consists of 15 items each, and was used to measure students' efficacy and interest in physics. Students' self-efficacy questionnaire (SEQ) is based on four point Scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) and Students' interest questionnaire (SIQ) is based on four point Scale of Always (A), Most times (MT), Sometimes (ST) and Not at all (NA). A face and content validity was established. The two instruments were validated by three experts from test and measurement and four physics teachers from four selected secondary schools.

The Kuder-Richarson formula (K-R₂₀) method was used to determine the reliability of PAT, this is because scores obtained from PAT are dichotomous with right = 1 and wrong = 0 (Joshua, 2012), while Cronbach-coefficient Alpha (α) method was used for determining the reliability of SEQ and SIQ because the scores generated are not polytomous (Joshua, 2012). The calculated reliability coefficient for PAT was 0.7311and that of self-efficacy and interest was 0.8167 and 0.762 respectively.

The experimental group was taught using flipped classroom method. In this method, the researcher created a video and sent to the subjects through WhatsApp group platform. After watching the videos, the students were asked to prepare their questions for class discussion. Thereafter, the research assistant gathered the subjects in experimental groups into smaller group based on the class size. The researcher then requested the students to discuss and ask their questions based on the video watched. The researcher then fielded all questions by answering them in the classroom.

Results/Data Analysis

The data collected was analysed using IBM statistical package for the social sciences (SPSS) version 20. Analysis of ANCOVA was used for testing the null hypothesis at 0.05 level significant

Research question 1

How does self-efficacy influence interest of students taught physics concepts with Flipped Classroom Method?

The research question was answered with the mean and standard deviation of the pre-test and post-test interest scores of students with high and low self - efficacy in the two treatment groups. The results are shown in table 1

Table 1 Mann and standard deviation of the interest scenes in physics of students with high								
Mean and standard deviation of the interest scores in physics of students with high a low self - efficacy in the treatment groups								
Treatment	Self –	Pretest	S	Posttest	S	Gain score		
	efficacy	Mean		Mean				
Flipped classroom	High	48.068	7.151	45.477	8.547	-2.591		
Method	Low	47.692	8.056	44.308	4.768	-3.384		

0.05 significant levels

The results in Table 1 showed that the gain scores of students are negative when flipped classroom method is used. The absolute values of the gain scores is high when taught with flipped classroom method. Gain scores of low self-efficacy students in the treatment groups are greater than their high self-efficacy counterparts. It can therefore be inferred that self-efficacy influences the academic achievement of students taught Physics concepts with flipped classroom methods, negatively.

Research question 2

How does self-efficacy influence academic achievement of students taught physics concepts with Flipped Classroom Method?

Table 2

Mean and standard deviation of the academic achievement in physics of students with high and low self - efficacy in the treatment group

Treatment	Self –	Pretest	S	Posttest	S	Gain score
	Efficacy	Mean		Mean		
Flipped classroom	High	15.955	3.14	21.796	6.170	5.841
Method	Low	15.692	3.59	20.846	6.914	5.154

The results on table 2 indicate that the gain scores of high and low self-efficacy students taught with flipped classroom method. In the treatment, students with high self-efficacy gain more score than low self-efficacy students. That means self-efficacy positively influences students' academic achievement when taught Physics with flipped classroom method.

Hypothesis 1

There is no significant influence of self-efficacy on students' interest in Physics when taught Physics with flipped classroom methods.

Table 3

Summary of the one-way ANCOVA of influence of self-efficacy on students' interest in physics when taught with flipped classroom methods

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Source	Sum of	df	Mean	F	Sig.	Partial Eta
	Squares		Square			Squared
Corrected Method	5983.733	4	1495.933	38.826	.000	.599
Intercept	482.761	1	482.761	12.530	.001	.108
Pretest of interest	4116.402	1	4116.402	106.839	.000	507
Treatment	.910	1	.910	.024	.878	.000
Self-Efficacy	9.229	1	9.229	.240	.626	.002
Treatment * Self- Efficacy	1.397	1	1.397	.036*	.849	.000
Error	4007.020	104	38.529			
Total	196349.000	109				
Corrected Total	9990.752	108				
*p > .05						

As shown in Table 3, the calculated F value for the interaction of treatment and self-efficacy is 0.036 which is not statistically significant at .05 level (p>.05). This means that there is no significant influence of self-efficacy on students' interest in Physics when taught Physics with flipped classroom methods. Therefore, the null hypothesis is not rejected.

Hypothesis 2

There is no significant influence of self-efficacy on mean academic achievement of physics students taught with flipped classroom methods.

Table 4

Summary of the one-way ANCOVA of influence of self-efficacy on students' academic achievement in physics when taught with flipped classroom methods

Source	Type III Sum	Df	Mean	F	Sig.	Partial Eta
	of Squares		Square			Squared
Corrected Method	1228.149 ^a	4	307.037	13.092	.000	.335
Intercept	1313.486	1	1313.486	56.006	.000	.350
Pretest	75.989	1	75.989	3.240	.075	.030
Treatment	510.833	1	510.833	21.781	.000	.173
Self-Efficacy	.717	1	.717	.031	.862	.000
Treatment * Self- Efficacy	10.879	1	10.879	.464*	.497	.004
Error	2439.081	104	23.453			
Total	40917.000	109				
Corrected Total	3667.229	108				

*p > .05

As shown in Table 4, the calculated F value for the interaction of treatment and self-efficacy is 0.464 which is not statistically significant at .05 level (p>.05). This implies that there is no significant influence of self-efficacy on students' academic achievement in physics when taught Physics with flipped classroom method. Therefore, the null hypothesis is not rejected.

DISCUSSION OF FINDINGS

The results of hypothesis one showed that, there is no significant influence of self-efficacy on mean interest of students taught physics with flipped classroom method.

The result of findings in this study is not in agreement with the result of findings of research conducted by Mizumoto (2012) which indicated that, there was an impact of self-efficacy on students' interest. The findings also showed that, there is interaction effect between self-esteem and self-efficacy on students' interest in Introductory Technology. Findings imply that that self-esteem and self-efficacy impacted students' interest in introductory technology subject.

The findings do not agree with the findings of Özyürek (2005) who found that, there was a significant indirect impact on interest through math related self-efficacy. The reason for variation in the present results on this study and that of Özyürek (2005) may be connected with the issue of the physics concept used in the study, and the sample size that was use in the previous study, could be another reason for dissimilarity in the results of findings in the study. Research area also may be considered as one of the factors that contributes to the contradiction of results, while the present study was conducted in Calabar Education Zone in Cross River State; others were conducted outside the Zone or state or even outside Nigeria.

Students' self-efficacy and academic achievement in science.

The result of hypothesis seven shows that, there is no significant influence of self-efficacy on mean academic achievement of physics students taught with flipped classroom methods.

The results of this study may seems inappropriate because one would have expected that, self-efficacy ought to have increased the academic achievement of students when taught with flipped classroom method. But the reason of indifference in results could be because of lack of students' involvement in the learning activities in the two teaching methods (FLCM and LM) which would have accounted for the better performance of students.

Secondly, students in the treatment group may have failed to use the full extent of the video sent to them by the teacher. Meanwhile, greater number of the students in this group still refused to attend the discussion section of the class, which was done in order to enhance their understanding of the lesson.

The results of this finding is in congruence with the result obtained from the study conducted by conducted by Kenna (2014) and Meera and James (2015) which indicated that there self-efficacy had was no statistically significant effect on academic achievement.

In contrary to the results obtained from study conducted by Wiginton (2013) who found that, there was also a significant difference found in self-efficacy among students in the flipped learning group and students in the conventional group respectively.

Results obtained from the study carried by Taasoobshirazi and Sinatra (2011) indicated that, there was a positive correlation between self-efficacy and physics conceptual understanding, as well as the student's physics academic achievement. Taasoobshirazi and Sinatra (2011) results also showed that, students with higher self-efficacy beliefs had higher course grades and a significant increase in student learning gains in the Force Concept Inventory (FCI).

A result of findings of study by Galyon, Blondin, Yaw, Nalls, & Williams, (2012) also disagrees with the results of finding in this study. The results from Galyon, Blondin, Yaw, Nalls, & Williams, (2012) showed that, academic self-efficacy predicted and exam performance. A research results from a study conducted by Abid, Muhammad, Aaqib & Farhat (2019) is not in supports with the result of findings from this study. Abid, Muhammad, Aaqib & Farhat (2019) found that, there was a significant relationship between the self-efficacy and academic performance of the students while studying at higher level learning, which implies that, self-efficacy has significant effect on students' academic achievement.

The results of this study may seems inappropriate because one would have predicted that, self-efficacy ought to have increase the academic achievement of students. But the reason of indifference in results could be because of lack of students' involvement in the learning activities in the two teaching methods (FLCM and LM) which would have accounted for the better performance of students.

Conclusion

It was hereby concluded that, there was a clear evidence that self-efficacy those not have any influence in students interest when taught physics concepts with flipped classroom method. Most so that self-efficacy can enhances students' academic achievement when taught physics concept with flipped classroom method.

Recommendations

Based on the results of the data analysis, the following recommendations are made.

- 1. Physics teachers should be exposed to FLCM through seminars or trainings to improve their inputs during teaching/learning.
- 2. Physics teachers should vary their instructional approach by using FLCM, this will improve the academic achievement of Physics students.

References

- Aamna, S., K., Irshad, U. & Shah, K. (2020). Practicability in Students' Scholastic Performance. Ilkogretim Online - *Elementary Education Online*, 19 (4), 4588-4599
- Abid, M. Muhammad A., Aaqib S. & Farhat S. (2019). The effect of self-efficacy on academic performance at higher level of learning: A Case Study of Punjab University Lahore. *Journal of Educational Sciences & Research Spring*, 6 (1), 33-47.
- Adie, E. B., Obi, J. J, Okri J. A. & Ogbe, A. O (2020) Effect of constructivist method of teaching basic science and mathematics on the academic performance of junior

secondary student' in Calabar Municipality, Cross River State. *Inter-disciplinary Journal of Education* (IJ-SED), 2(1). 1-9, e-ISSN: 2695-2054

- Adie, E. B., Inah L. I, Ibu P. N, Anditung P. A, & Igyo C. O. (2022) Effect of Concept Mapping strategy on the academic achievement of post basic students in mathematics in Obudu Education Area of Cross River State, Nigeria *Inter-disciplinary Journal of Education* (IJ-SED), 4(1). ISSN: 2695-2054
- Afriani, Z. L. (2020). The effect of Question Answer Relationship (QAR) Strategy in enhancing students' reading comprehension. *Journal of English Education and Teaching*, 4(4), 548-558.
- Ahmad, A. & Triantoro, S. (2013). Effects of Self-Efficacy on Students' Academic Performance Effects of Self-Efficacy on Students' Academic Performance. *Journal of Educational*, *Health and Community Psychology*, 2, (1)
- Ali GarbaKolo, Wan Munira and Nobaya. (2017) Relationship Between Academic Self-efficacy Believed of College Students and Academic Performance, *Journal Humanities and Social Science*, vol. 22, No. 1, GMBH
- Assefa, B., Ohijeagbon, I. O., Negash, S. & Melese, G. (2008). Action Research on Enhancing Academic Excellence in A study Program. *Ethiopian Journal of Education and Sciences*, 3 (2), 71-80
- Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall
- Bandura, A. (1997b). Self-Efficacy: The exercise of control. New York: Freeman.
- Bassi M et al. (2007). Academic Self-Efficacy Beliefs and Quality of Experience in Learning, *Journal of Youth and Adolescent*, 36, 3, PubMed.
- Bekomson M., Bryant J., Achi N., Melvina N., Amalu, A. N., Mgban, & Abang B. K.(2020).
 "Interest in Extra Curricular Activities and Self Efficacy of Senior Secondary School Students in Cross River State, Nigeria." International Education Studies 13, (8), 79-87
- Bruner, J. (1966). *Toward a theory of instruction. Cambridge*, MA: Harvard University Press, page 72
- Bruner, J. S. (2009). The process of education. Harvard University Press
- Carmichael, C., Callingham, R., Hay, I & Watson, J. (2010).measuring middle schoolstudents" interest in statistical literacy.
- Clark-Ibanez, M. & Scot, L. (2010). Learning to teach online. *Teaching Sociology*, 36(1) 34-41.
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53, 109–132.
- Fakolade, O. A., & Bamidele, O. (2017). Self-esteem and peer influence as predictors of learning outcomes in mathematics among high ability students in ibadan, Oyo State, Nigeria. Sokoto Educational Review, 17(2), 13-13
- Forgasz, H. (2006). Australian year 12 "Intermediate" level mathematics enrolments 2000-2004: Trends and patterns. In P. Grootenboer, R. Zevenbergen & M. Chinnappan (Eds.),
- Galyon, C., Blondin, C., Yaw, J., Nalls, M., & Williams, R. (2012). The relationship of academic self-efficacy to class participation and exam performance. *Social Psychology of Education*, 15 (2), 233-249.
- Ghanney, R. A., & Aniagyei, D. F. (2014). An investigation into the poor academic performance of students. *Research on Humanities and Social Sciences*, 4(9), 8-18.
- Kenna, D. C. (2014). A study of the effects of flipped classroom method on students' selfefficacy (Master's thesis). Retrieved from proQuest Dissertations and theses data-base (UMI No. 1563865) on June, 2021.
- Khan, H. A., Qurashi, M. M., Hussain, T. & Hayee, I. (2005). Physics in our lives. Commission on science and Technology for Sustainable Development in the South Comsats Headquarters, pp 9

- Lucy N. O., Mary. N., Elizabeth I. A. & Chinazor C. O. (2022). Self-Efficacy and Self-Esteem as Determinants of Students' Interest in Introductory Technology in Anambra State, Nigeria. The Universal Academic Research Journal Article History. (23) 39-47
- Meera K. P. & Jumana. M. K. (2015). Self efficacy and Academic Performance in English, retrieve from, research.rs/wpcontent/uploads/2015/12/03-Meera-Jumana.pdf
- Mizumoto, A. (2012) Exploring the Effects of Self-efficacy on Vocabulary Learning Strategies, *Studies in Self-access Learning Journal*, 3, (4), retrieve from sisaljournal.org
- Mull, B. (2012). Flipped learning: A response to five common criticisms. Retrieved from Net on November 12th, 2020.
- NECO (2011) Chief examiner's report, Mina, National Examinations Council.
- Nghambi, G. H. (2014). Factors contributing to poor academic performance in certificate of secondary education examination for community secondary schools in Urambo District, Tabora, Tanzania (Master thesis, University of Tanzania, Tanzania). *Planning and Policy Studies of the Open University of Tanzania*, 1-94.
- Özyürek, R. (2005). Informative sources of math-related self-efficacy expectations and their relationship with math-related self-efficacy, interest, and preference. *International Journal of Psychology*, 40, 145-156.
- Ramnarain, U., & Ramaila, S. (2017). The Relationship between Chemistry Self-Efficacy of South African First Year University Students and Their Academic Performance. *ChemistryEducation Research and Practice*, 19, 60-67.
- Robb, L. & Rudy, M. (2012). Transferring Online learning through Narrative and Student Agency. *Journal of Educational Technology & Society*, 15(4), 344-355.
- Sani, A. (2012). Role of physics education for technological development for employment and self-productivity in Nigeria. *Journal of Educational and Social Research*,2 (10).
- Siqueira, C. M., & GurGe-Giannetti, J. (2011). Poor school performance: *An updated review*. Rev Assoc Med Bras, 78-86.
- Taasoobshirazi, G. & Sinatra, G. M. (2011). A structural equation method of conceptual change in physics. *Journal of Research in science Teaching*, 48, 901-918.
- WAEC. (2022). Summary of results on students' performance Statistics for 2018, 2019, 2020, 2021 & 2022.
- Wiginton, B. L. (2013). Flipped instruction: An investigation into the effects of learning environment of students' self-efficacy, learning style and academic achievement in an Algebra I classroom (Doctoral Dissertation). Retrieved from pro Quest Dissertation and theses database (UMI No. 3612166) on 4 /5/2021.
- Williams, E. (2018). What is the meaning of academic performance? Accessed from <u>https://work.chron.com/meaning-academic-performance-17332.html</u>.