

Impact of Flipped-classroom Approach on Secondary School Students' Motivation and Academic Achievement in Geography in Kebbi State, Nigeria

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Abstract

This study examined the impact of the flipped classroom approach on secondary school students' learning motivation and academic achievement in Geography. The study employed a mixed-method approach to gather both qualitative and quantitative data so as to measure the effectiveness of the approach. A total of 71 students participated in the study, which was drawn using purposive sampling technique from two intact classes. The first class was assigned as the experimental group and the second class was taken as the control group. The study was undertaken in four weeks, where the students in the experimental group were taught with a flipped classroom approach, while the lessons in the control group were delivered through a conventional method. Both groups were administered a test before and after the treatment. A 30-item Geography achievement test, a motivation scale and semi-structured interviews were used as tools to collect data. The instruments were subjected to face and content validity by experts in the field of Geography, Educational Psychology and Educational Technology. A pilot study was carried out to determine the reliability and test-retest procedure was followed to obtain the reliability coefficient of 0.82 and 0.76. The findings of this study revealed statistically significant differences with the mean gain of 18.45 in terms of motivation scores and a mean gain of 23.60 for academic achievement scores. The study discovered that the flipped classroom approach had a positive impact on students' learning motivation and academic achievement in the geography class. It was recommended among others that Educators should harness the potential of the flipped classroom to foster motivation and academic achievement in Geography in secondary schools in Kebbi State and Nigeria as a whole.

Keywords: *Flipped-Classroom Approach, Conventional Approach, Geography, Academic Achievement, and Motivation.*

INTRODUCTION

The technological revolution in education experienced in recent years has helped educators to be more creative for effective teaching. Educational technologies are creating learning opportunities that are breaking the barriers of the same place and the same time teaching and learning (Dominic *et al*, 2024). This breakthrough of advanced educational technologies has resulted to a paradigm shift in both teaching and learning, which is no longer limited to occur within the classroom environment but anywhere and at any time. This development therefore has brought some form of change to the traditional classroom system, where the teachers and the students will have to spend most of the time

delivering and listening to instructions and explanation of concepts in a well designated place called the classroom.

Educational technologies are not just offering alternative approaches to traditional classroom environment, they are also increasingly gaining significant in teaching and learning many subjects across all levels of education in recent years than ever in the past. In essence, Falode and Mohammed (2023) has emphasized that these technologies are essential to teaching and learning of subjects like Geography in schools. Teaching and learning Geography particularly at secondary school level can well be supported with technologies alongside with systematic strategies that are capable of bringing improvement and or reinvention to its curriculum delivery process within or outside the classroom systems.

Geography is one of the earth science subjects taught in schools. Its concept goes beyond just memorizing maps and capitals. It involves understanding the world around us, its physical and cultural characteristics, and how they interact with each other. Thus, it is concern with the study of both natural and man-made features on the earth surface, beneath and above it. It is also about the spatial location of places, things and events as well as association and changes as a result of occurrences on the earth (Falode & Mohammed, 2023). Ekpoto, *et al.*, (2022) regarded geography as a discipline which gives explanation of the interrelationships existing between man, his environment and his activities in the environments, especially in spatial context. This shows that the knowledge of geography is importance in maintaining environmental balance and human survival. Hence, much emphasis is required on the teaching and learning Geography in schools for the purpose of building a friendly environment for the successful survival of man on this planet earth.

In Nigeria, Geography has been included in secondary school curriculum primarily to provide knowledge and skills that will help the citizens analyse spatial interactions and interpret relationships between man and the environment for the purpose of building a friendly ecosystem within and beyond immediate location (FRN, 2014). This is to help Nigerians cope with life situations, observe environmental changes and make predictions of spatial patterns in natural and the human phenomena, such as emerging population, settlements, soils, water and man's behaviour (Muhammed *et al*, 2021). Thus, Olaniyi & Oladokun (2021) reported that Geography has the capacity to promote national integration and national unity for sustainable economic growth and national development.

In spite of the significance of its knowledge to the national development, however, there is growing concern regarding teaching and learning of Geography in Nigerian schools. Empirical evidences in this

regard such as that of Aun *et al.*, (2020), Muhammed *et al.*, (2021), Eze (2021) and Ekpoto *et al.*, (2022) have all associated the problems of teaching and learning of Geography in Nigerian schools to the use of teacher-centred teaching strategy that largely characterise conventional method, ill-equipped classrooms and laboratories, inadequate provision of instructional media and dearth of the available materials that resulted to low utilization of instructional media, use of foreign documentaries that students are not familiar with, inadequate practical and or field studies. Also, poor funding, lack of motivation, poor students' achievement, weak government policy that considered Geography as an elective subject in school. This has resulted to reduced motivation in secondary schools and beyond. Hence, the poor performance of students in Geography recorded at the senior secondary school certificate examinations in Nigeria in recent times can be attributed to the variety of issues identified above. Nevertheless, selecting a good teaching strategy and modern instructional media can go a long way to ameliorating some of these problems, especially by improving students' motivation and academic achievements in Geography. One of the several instructional strategies that accompanied educational technology development and is proven capable of transformative teaching and learning of complex concept like Geography in schools for better understanding among its students is the flipped classroom (Bosch Farré *et al.*, 2024).

The flipped classroom is an alternative approach to the popular traditional learning environments. The approach is increasingly gaining significant attention in recent years than ever in the past. It is considered as an inverted classroom or reversed of the familiar classroom instruction, which introduced students to the new material through videos or online lectures before coming to class (Lejia *et al.*, 2024). This allows students to work in their pace, pause and rewind as many times as needed, and come to class with prior knowledge of the concept learned at home. Then, during class time, the teacher engages students in interactive activities, discussions, and application of the concepts learnt at home. Cabi (2018) and Sun *et al.* (2024) stressed further that in the flipped classroom approach, learners are composed to the content in video formats at home and solve problems arising from the home study. Chukwuemeka *et al.* (2021) and Elshaye (2024) associated the flipped classroom with a teaching technique which makes use of computer technologies such as video lessons and interactive learning activities outside of the traditional classroom setting. Where the internet service is not accessible, teachers can present lesson(s) in video or audio format through recording on CD, VCD, DVD, Flash Drive, and MP3 or MP4. The recorded lesson materials may be delivered to students, which they will take homes, where they will play, watch and listen repeatedly at their convenience while discussions

will be done in the classroom. Learners play the content videos or audio repeatedly at their convenience at home and discussion on problems arising from the video and or audio watched or listened will be done in the classroom (Elshaye, 2024). Hence, flipped classroom is considered as a switch from the in-class teaching and learning activity dominated by the traditional system to a largely personalised teaching and learning strategy.

As an innovative pedagogy capable of creating effective teaching/learning environment, flipped classroom can specifically be very useful in teaching subjects that requires real-life experiences like Geography in secondary schools. Thus, the strategy is one of the best areas of technology application in education (Zheng *et al.*, 2020; Nsor-Ambala, 2024). The flipped classroom model advocated for progressive activities, engaging experiences, and diversified platforms (Chen-Hsieh *et al.*, 2017; Samadi *et al.*, 2024). It makes learners more active in both class and home, as they internalize the contents through a wide range of activities. Furthermore, it can restructure the learning environment and time in a flexible way, while taking note of the individual learner's expectations and needs. It is a learner-centred approach with qualities of providing rich learning opportunities. The technique keeps track of the difficulty level of the contents and prepares students for discussion that will maximize conceptual understanding of the contents. Therefore, the purpose of flipped classrooms is to increase learner-content interactions thereby reducing the routine tasks of the teacher in the class (Nsor-Ambala, 2024). Its main concern is on the content delivery to the learners which is opposed to the traditional classroom approach that is largely teacher dominated. Zheng *et al.* (2020) posited that the activities within the flipped classroom approach encompass warm-up activity, Question and Answers session about the video, and practice or study through the video. The class time is mainly used for discussion, clarification and contribution among the students (Ifeanyi & Ugwu, 2022).

The flipped classroom strategy is a technology-based pedagogy that has the power of creating effective teaching/learning opportunities for students, particularly in secondary education. Thus, the strategy is considered one of the best areas of technology application in education domain (Zheng *et al.*, 2020). Based on empirical evidence gathered, it was revealed further that the integration flipped classroom pedagogy in teaching and learning provided positive benefits in students' engagement in the classroom, motivation, higher academic achievement, autonomy, problem-solving skill and critical thinking ability among others. For instance, the studies of Lin *et al.* (2018) and Sun *et al.* (2024) reported that it has the ability to promote students' learning and improved their academic achievement. Learners derived more satisfaction in learning using flipped classroom system compared to the

traditional classroom (Sergis *et al.*, 2018). Zheng (2017) has found that the flipped classroom approach facilitates student learning, enables visualization in teaching, and contributes to permanent learning. Also, it increases students' motivation, a learning prerequisite that is highly required in a Geography class (Chyr *et al.*, 2017; Falode & Mohammed, 2023). Shen and Chang (2023) maintained that the flipped classroom approach enabled students to exhibit higher levels of deeper learning than their traditional classroom counterparts.

As a learner-centred approach, it requires students to take more responsibility for their learning progress which empower them to gain more learning satisfaction compared to the traditional classroom (Lejia *et al.*, 2024). Andhini and Widodo (2024) have found that the flipped classroom approach facilitates students' capacity for autonomous learning, enables visualization in teaching, which promotes academic achievement. Also, it was discovered that it increases students understanding and motivation (Nsor-Ambala, 2024). Flipped classrooms significantly improved student academic achievement compared to the non-flipped classroom setting and this has a more progressive impact on students' problem-solving skills (Yu *et al.*, 2023). Ng (2024) discovered in his study that the implementation of a flipped classroom has resulted in increased examination scores and brought about improvement in content knowledge across the subject areas compared with the traditional classroom approach. Samadi *et al.* (2024) have found out that flipped classroom approach fosters self-directed learning skills and students' engagement in evaluating, analysing and creating.

Therefore, as this approach positively shapes students' self-regulated learning and higher-order thinking skills, the researchers advocate for its incorporation in teaching geography concepts in secondary schools. Hence, it is on this note that this study is set to investigate the impacts of the flipped classroom strategy on students' motivation and academic achievement in Geography at secondary school level.

Statement of the Problem

Recent interruptions due to insecurity, disasters and pandemics like COVID-19 in schooling have brought about educational setbacks in most parts of Kebbi State and Nigeria as a whole. These interruptions have created learning gaps, achievement gaps, poor learning motivation and consequentially high dropout and out of school rates across Kebbi State (Dominic *et al.*, 2024). Additionally, the use of conventional approach to teaching and learning Geography in Nigeria, particularly at the secondary school level has been heavily criticised. This is because students are passive during teaching and learning process. Hence, the negative effect of continuous use of this

approach in teaching and learning Geography will result to poor motivation of students leading to poor academic achievements, since students cannot remember what they have learnt after a short while.

Based on these educational issues, it has become necessary to search for pedagogies that will best keep the students engaged during teaching and learning process and improve their academic gains. Hence, the choices to test the effectiveness of the flipped classroom approach in this regard. Although previous reviews have shown the positive impact of the flipped classroom approach elsewhere, there were insufficient studies that have examined the effectiveness of this approach on both students' motivation and academic achievement in secondary schools across the country. Furthermore, most of these previous researches largely reported researchers' opinions on the level of adoption of this approach in Nigeria schools, with little or no focus on the specific subject domains, such as Geography taught in secondary schools. Hence, the present study attempts to fill the research gaps identified.

Objectives of the Study

The study was guided by two objectives as follows:

1. Examine the effectiveness of the flipped classroom approach on the learning motivation of students in Secondary School in Aliero, Kebbi State.
2. Examine the effectiveness of the flipped classroom approach on the academic achievement of students in Secondary School in Aliero, Kebbi State.

Research Questions

In line with the research objectives, two research questions were raised to guide the study. They are:

1. Is there any significant difference between the experimental and control groups in terms of learning motivation?
2. Is there any significant difference between the experimental and control groups in terms of academic achievement scores?

CONCEPTUAL REVIEW

Flipped Classroom Approach

The flipped classroom approach is a teaching strategy that involves a combination of different types of learning and provides a focus on active student engagement (Andhini & Widodo, 2024). Ma *et al* (2024) considered it an effective teaching approach that fosters students' self-learning, stimulates learning motivation, and overall improves the academic performance of students. In this approach, the classroom becomes a dynamic and interactive learning environment (Akintolure *et al.*, 2024). Candle *et al.* (2024)

have regarded the flipped classroom approach which involves students learning the course content online or digitally, such as through video tutorials outside the classroom, and performing different student-centred interactions, such as group discussion and problem-solving inside the classroom. The approach promotes student-centred learning in which students absolutely control their learning process at home and actively participate in classroom activities, while teachers take on the role of facilitators, motivators, and evaluators providing immediate feedback on students' progress. Kadiri (2024) considered a different way of learning, in which students obtain new knowledge not only in the classroom but in other spaces such as at home when employing videos, educational audio files, images, and learning virtual platforms and Learning Management Systems (LMS). It is a pedagogical approach to the teaching–learning process, through which direct instruction takes place outside the classroom and face-to-face time is employed to develop meaningful and personalized learning activities.

According to Zhou (2023) flipped classroom is teaching and learning approach that enables educators to make of use of educational technologies to create effective teaching and learning environment, including recorded lessons and videos, to make learning more engaging experiences for learners. In flipped classroom model, learning does not seem to be limited to the four walls of classroom environment. The teachers may not have to spend most of the class time and delivering instruction to the students; as the will lead tutorial, while students can also take different roles. Tunggyshbay *et Al.* (2023) considered filliped classroom as a teaching approach that involves using video-based learning materials that can be used outside of the classroom, which is accompanied by an interactive group learning activities, problem-solving and or group work during class time, where students apply the concepts learned in the video-based materials.

According to Moore and Craciun (2024) flipped classroom is a pedagogical approach that allows students to invert the traditional (conventional) classroom such that students review materials before class and then participate in active learning techniques during class. Bosch Farré *et al* (2024) viewed flipped classrooms as a teaching and learning approach that reverses the traditional way of teaching by putting an active focus on the student. It is a dynamic methodology in which the teacher facilitates the student's learning by providing adequate material for the prior preparation of the classes and accompanying them in the deepening of the contents and the resolution of situations or problems related to the subject of study within the classroom. For this reason, it is considered an innovative teaching methodology. Flipped classroom is an educational approach that reverses the traditional model of classroom instruction and is reserved for class discussion and interactive projects (Guo & Wang, 2024).

Hence, it is an instructional approach, characterized by pre-class online content delivery and in-person interactive activities and students' acquisition and application of knowledge to solve problems.

Flipped Classroom and Students' Motivation

In recent studies, the impacts of the FC Model on student performance, engagement, learning outcomes, and motivation have been investigated. Studies have shown that the use of the flipped classroom approach provided positive results in active student learning motivation. Andhini and Widodo (2024) have found that the flipped classroom approach facilitates students' capacity for self-motivated learning, with visualization in teaching, which promotes academic achievement. Koh and Ahn (2023) examined the contributions and educational effects of flipped learning and sustainable language education on motivation and found out that flipped learning has a metacognitive effect on learning and knowledge and motivate students' active and subjective attitudes toward participatory lessons. Gustian *et al.* (2023) has discovered that the video components of the flipped classroom are a source of motivation for the students. Most students are driven to watch and watch educational videos until they achieve mastery of the contents. Ateş (2024) designed and tested a self-regulated flipped learning approach and found out that the experimental group outperformed the control group in terms of academic achievement, attitudes, self-regulated learning, and learning motivation. Dutta *et al.* (2023) undertook a study among undergraduate engineering students to determine the impact of the augmented reality, learning system on the critical thinking skills, learning motivation and knowledge gain of students and discovered that it has a significant positive impact on the critical thinking skills, learning motivation, and knowledge gain of students. Sourg *et al.* (2023) evaluated the effectiveness of the flipped classroom model on the academic achievement of students in terms of increased performance and perception as compared to the traditional lecture the medical students in Al-Neelain University-Sudan and discovered that more than 90% of students were more motivated to learn in flipped classrooms meeting learning targets when they used flipped classroom model. An investigation to determine the effects of combining project-based learning and flipped classroom methods in university education on the learning motivation and learning outcomes of undergraduate students, postgraduate students and higher vocational education and training levels was undertaken by Köpeczi-Bócz (2024) and found that in graduate students and higher vocational education and training levels significantly improved their learning motivation and achievement.

Flipped Classroom Approach and Students' Academic Achievement

Moore and Craciun (2024) compared the students' learning styles in the flipped Classroom to those of traditional classes and discovered that there is greater satisfaction, greater motivation to learn, and more positive perceptions of learning outcomes in the flipped classroom compared to traditional class setting. Akintolure et al. (2024) examine students' academic performance in practical physics among secondary schools in Lagos State, Nigeria using the flipped classroom model. Results revealed that flipped classrooms yielded a positive effect on student academic performance in practical physics among secondary schools in Lagos state. This finding implies that it demonstrated the potential of the flipped classroom approach to positively impact learners' self-regulated learning and higher-order thinking skills leading to academic success. Yu *et al.* (2023) revealed that flipped classrooms significantly improved student academic performance compared to the non-flipped classroom setting and this has a more progressive impact on students' problem-solving skills. Ng (2024) equally discovered in his study that the implementation of a flipped classroom has resulted in increased examination scores and brought about improvement in content knowledge across the subject areas compared with the traditional classroom approach.

In a study, Kadiri (2024) integrated social-media platforms into teaching-learning activities in the college of education through the use of flipped classrooms with the specific aim of determining its effect on students' academic achievement. It was revealed that significant differences existed between the mean achievement scores of students taught Economics using flipped classroom instruction and those taught using conventional lecture methods. Therefore, flipped classroom instruction enhanced students' academic achievement more than the conventional lecture method. Lejia *et al.* (2024) have opined that the self-regulated learning that comes with the flipped classroom approach has a positive effect on student's academic achievement, especially as it requires students to take more responsibility for their learning progress. Contrarily, Abosede *et al.* (2024) investigate students' self-assessment demonstration-based flipped classroom instructional strategies on pre-degree students' achievement in Physics in the Ilorin metropolis. Studies have found no significant difference in performance between students taught using a demonstration-based flipped classroom and students taught using traditional methods. As a result, it was found that the use of demonstration classes did not significantly affect the improvement of students' academic performance

The Traditional Classroom System in Nigeria

Traditional classroom setting has remained the main practice of Nigeria's education setting. This is sustained despite the provision in the Nigeria National Policy of Education, which stresses that the goal of education is not only to increase the amount of knowledge gained but to create the possibilities for a Nigerian child to think critically and intensively to grow citizens who can invent and discover new things (FRN, 2014). This may no longer be visible under traditional practices. Therefore, there is a need to critically consider inclusive, equitable, and high-quality education by harnessing opportunities arising from technological advancements and the digital revolution.

The major delivery mode in the Nigerian school system is via a conventional method that is largely dominated by auditory training only. Ikechukwu and Amos (2023) have regarded traditional teaching and learning methodology as a system in which the instructor is handed the task of translating the curriculum in the classroom and the students complete the exercises at home. It is a form of instruction by which the teacher stands in front of the classroom, delivering a 40-45minutes lecture to many students, while writing on a chalkboard/whiteboard, and the students pretend to be quietly listening to the teacher as they take notes and copy take-home quizzes/assignment to which they will work it out individually and submit their completed homework for scoring the next day. Even if the students have questions to ask, there would not be enough time to vividly respond to them, because the class cannot fall behind schedule (Ganiyu, 2022). Hence, this form of teaching and learning process is often characterized by a rigid process and supported by traditional methodologies and technologies such as instructional print materials, blackboards, and posters among others (United Nations Education, Scientific and Cultural Organisation: UNESCO, 2022; Chukwuemeka *et al.*, 2025).

Flipped Classroom and Its Application in the Nigeria Education System

The Nigerian children like their counterparts in other countries are immersed in technology, as they are part of the digital natives. Empirical evidence has revealed an increasing use of technology devices among students in Nigeria institutions than ever before (Kadiri, 2024). Students nowadays have become technologically inclined and spend more time on their mobile phones and laptops at the expense of individual learning. This is posing serious challenges to the effectiveness of conventional teaching and learning modes and the overall academic performance of students. Hence, there is a need for the incorporation of the technology-based teaching-learning technique.

Although the implementation of flipped classroom pedagogy in educational environments has garnered considerable attention in the global education settings due to its potential impacts on students' performance, engagement, positive learning outcomes, and motivation, however its adoption and

implementation in the Nigeria education system has been limited by poor funding of the education sector. In fact, the education is one of few sectors of the economy receiving small budget allocation. Nja *et al.* (2022) reported that Nigeria allocates very little resources in her budget to education, which is far below the mandatory 26% benchmark of budgetary allocation for education, proposed by the United Nation standard. As at 2021, education allocation is just above 5.6%. There was only a little addition in the subsequent budgets. In essence, this poor funding has resulted to shortages of teaching and learning resources and other facilities. Thus, Nigerian schools are lacking modern educational technology drivers such as smart classroom, computers, and the internet access among others.

In addition, there is a dearth of scholarly investigations that specifically delve into the utilization of the flipped classroom approach at different levels of education within the context of Nigeria. For instance, in the realm of flipped classroom implementation and its impacts on the Nigeria education system, an insightful investigation was undertaken by Egara and Mosimege (2023) to determine the effect of flipped classroom approach on mathematics achievement and interest of students in Igbo-Etiti Local Government Area in Enugu State, Nigeria and found out that students taught mathematics utilising flipped classroom approach had higher mathematics achievement and interest scores than their peers taught using the conventional approach. Thus, their study shed light on the critical significance of the use of flipped classroom pedagogy in teaching subjects in secondary schools in Nigeria. Similarly, Osuafor and George (2023) have applied the flipped classroom instruction strategy via Google Classroom to test its effect on secondary school student's academic achievement in chemistry in the Onitsha educational zone. The empirical evidence presented in their study revealed that there is a significant difference in the academic achievement of students taught chemistry using flipped classrooms and those taught with conventional lectured methods.

In a study Sowunmi *et al.* (2024) examined the Flipped Classroom Learning Strategy (FCLS) and its effects on students' achievement and retention in Basic Science in Lagos State, Nigeria and found that significant differences existed between students taught concepts in Basic Science with flipped classroom approach and those taught the same concepts in Basic Science using conventional lecture method in terms of academic achievement and retention. Therefore, their study unearthed the need for teachers to adopt student-centred instructional strategies like the flipped classroom learning strategy in teaching subjects in secondary schools to promote wide implementation in Nigeria.

THEORETICAL FRAMEWORK

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Constructivism Theory

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Constructivism theory is a psychological perspective that has gained significant popularity in recent years. It was first introduced by Swiss developmental psychologist, Jean Piaget in the early 20th century, and has since been expanded upon by many other scholars, including Lev Vygotsky, John Dewey and Jerome Bruner among others. This theory proposes that individuals actively construct their own knowledge and understanding of the world through their experiences and interactions with others.

Jean Piaget observed that children develop their understanding of the world through their exploration and interactions with their environment. Learning based on this theory is not simply the acquisition of knowledge, but rather a continual process of constructing and reconstructing knowledge through one's experiences. Constructivism theory holds that individuals actively engage in making connections between new information and their existing knowledge and beliefs. As a result, individuals construct their own unique understanding of the world. The theory posited further that learning is an individual and subjective process. This means that individuals construct knowledge in their own unique ways, based on their own perceptions, experiences, and beliefs. Therefore, learning cannot be standardized or taught in a one-size-fits-all approach. Each individual has their own unique way of understanding the world, and thus, effective learning must adapt to these individual differences.

Unlike traditional educational approaches, which focus on rote memorization and passive learning, Constructivism theory encourages active engagement, critical thinking, and problem-solving skills. This aligns with the current educational shift towards student-centred learning, where students take an active role in their own learning processes. As flipped classrooms allow students to watch lectures or videos at their own pace and in their own environment, it enables them to improve understanding of concepts, connecting to real-world examples, and engaging with the material in a meaningful way. Instead of just being passive listeners to teachers' presentation, students are provided with opportunities to apply their knowledge through active learning participation. This allows students to experience and visualize the concept, making it more important and engaging. More so, the flipped classroom approach provides an avenue for students to engage with each other and the teacher during class time. This allows for the exchange of ideas, discussion, and peer learning, all of which can enhance understanding and retention of the concepts of in Geography. Students can access the material in a way that best suits their

learning style and can also work through the material at their own pace, allowing them to review and reinforce their understanding before coming to class. Hence, this theory emphasises student-centred learning which can significantly influence motivation and academic achievement of students, especially in a Geography class.

RESEARCH METHODOLOGY

Research Design

This study employed a mixed method approach using quasi experimental with pretest and post-test non-randomise and non-equivalent control and in-depth interview to gather both qualitative and quantitative data so as to measure the effectiveness of the FC approach. The analysis of both qualitative and quantitative data unveiled the degree of impact of the flipped classroom strategy on students’ learning motivation and academic achievement.

Quantitatively, the study adopted a pre-test–post-test non-equivalent and non-randomized quasi-experimental design. This design unbiased assigns groups as: “experimental and a control group”. The first group was the experimental group which was taught using a flipped classroom strategy, and the second group was the control group which was taught in a lecture method in the traditional classroom environment. In both groups, a pre-test was carried out to determine students’ entry behaviour. It is a four weeks study. Each week within the four-week study period, 40 minutes of lessons on the topic: “Rotation of the Earth” were conducted both on face-to-face and on a recorded video. The student’s academic achievements were measured by administering a test before and after the treatment. The design is shown in table 1 below:

Table 1: Design specification

Group	Pretest	Treatment	Post-test
Experimental (34)	X ₁	T _{FCA}	X ₂
Control (39)	X ₁	T _{LM}	X ₂

Key: X₁: Pre-test for both experimental and the control groups; T_{FCA}: Treatment for experimental group and T_{LM}: Lecture method; X₂: Post-test for both experimental and the control groups, respectively

Qualitatively, the study collected data through semi-structured interviews with 20 students who participated in a flipped Geography class. The interviews were directed toward gathering in-depth insights into students' learning motivation and academic achievement. The data were analysed using thematic method.

The Sample

The sample of this study included a total of 71 Senior Secondary School 1 (SS I) Geography students in 2 separate intact classes from 2 co-educational schools within Kebbi State. The participants were purposively selected from the 2 schools under study; with 32 students from Government Girls Comprehensive Secondary School Aliero forming the experimental group and 39 students from Government Girls Comprehensive Secondary School Argungu in the control group. Government Girls Comprehensive Secondary School was assigned as the experimental largely due to availability of PDAs that can serve the class size. The 2 intact classes were used because the researchers could not randomize without disrupting the school's academic activities.

Instrumentation

In this study, motivation Scale and academic achievement tests were used as data collection tools. Motivation Scale (MS) developed by Pintrich, Smith, Garcia, and McKeachie (1991) was adapted, modified and used to suits the study. The modified instrument includes 6 factors within a four-point Likert Scale-type grading system, varying between “Highly Motivated” and “Highly Not Motivated”. The achievement test was designed by the researcher. It was developed in line with the table of specifications prepared in light of the objective specified for the topic in the curriculum. It was composed of multiple-choice questions. The validity of the research instrument was established by experts in instructional technology and Geography and the reliability analyses were made using the Pearson Product Moment Correlation Coefficient and reliability index of 0.79 and 0.82 was achieved for the two instruments, respectively.

Out-of-Class Activities

Due to difficulty in accessing high-quality internet services in the study area, recorded video instructions produced by the researchers in line with the scheduled weekly activities were stored in the PDAs of the school. Having watched the assigned instructional videos, the students were expected to come to the classroom with prior knowledge on the lesson for discussion and assessment.

RESULTS AND DISCUSSION

To examine whether the experimental and control groups were equal, the two groups were compared in terms of academic achievement and motivation. Independent t-test was used to compare the academic achievement and motivation of the groups. The result of the analyses are presented in tables 2 and 3 below:

Results

Table 2: t-test result for pre-test Scores of the Experimental and Control Group on Learning Motivation

	Groups	N	Mean	SD	Df	t-cal	P
Motivation	Experimental Group	32	47.54	6.23	69	0.32	0.71
	Control Group	39	46.42	7.11			

Not significant at $p > 0.05$

Table 2 shows independent sample t-test results for pre-test learning scores of the experimental and control groups on learning motivation. The study found no significant difference between the mean scores of the groups in terms of learning motivation { $t(71) = 0.3, df = 69, p > 0.05$ }. Based on this finding, it can be deduced that both the experimental and control groups were equal in terms of learning motivation scores.

Table 3: t-test result for pre-test Scores of the Experimental and Control Group on Academic Achievement

	Groups	N	Mean	SD	Df	t-cal	P
Academic achievement	Experimental Group	32	51.81	10.43	69	1.73	0.09
	Control Group	39	48.73	11.42			

Not significant at $p > 0.05$

Table 3 shows independent sample t-test results for pre-test learning scores of the experimental and control groups on academic achievement. This study found no significant difference between the mean scores of the groups in terms of achievement { $t(71) = 1.7, df = 69, p > 0.05$ }. According to this finding, it can be concluded that both the experimental and control groups were equal in terms of achievement scores.

RQ1: Is there a significant difference between the experimental and control groups in terms of learning motivation?

Table 4: t-test results for Post-test Learning Motivation Scores of the Experimental and Control Groups

	Groups	N	Mean	SD	Df	t-cal	P
Motivation	Experimental Group	32	65.95	9.61	69	4.27	0.034
	Control Group	39	61.53	13.03			

Significant at $p > 0.05$

Table 4 shows independent sample t-test results for post-test learning motivation scores of students taught Geography using flipped classroom approach and those taught with lecture method. The result of table 4 revealed the learning motivation of students in the experimental and control groups at 0.05 level of significance { $t= 4.27, df = 69, p < 0.05$ }. This showed that there is a significant difference between the post-test mean scores of the experimental and control groups on learning motivation. Therefore, the flipped classroom approach has increase students' motivation in learning Geography.

RQ2: Is there a significant difference between the experimental and control groups in terms of academic achievement scores?

Table 5: t-test results for Post-test Academic Achievement Scores of the Experimental and Control Groups

	Groups	N	Mean	SD	Df	t-cal	P
Academic Achievement	Experimental Group	32	75.41	7.35	69	3.47	0.02
	Control Group	39	70.04	9.61			

Significant at $p>0.05$

Table 5 shows independent sample t-test results for post-test academic achievement scores of students taught Geography using flipped classroom approach and those taught with lecture method. The result of the analysis in Table 5 revealed that there was a significant difference between the post-test mean scores of the experimental and control groups on academic achievement. The result showed { $t= 3.47, df = 69, p < 0.05$ }. Therefore, it can be deduced that the flipped classroom approach have increased students' academic achievement.

Table 6: Mean and Standard Deviation of Pre-test and Post-test Learning Motivation and Academic Achievement Scores of Students Taught Geography with Flipped Classroom Approach

Variables	Pre-test			Post Test		Mean Gain
	N	Mean	SD	Mean	SD	
Learning Motivation	32	47.54	6.23	65.95	9.1	18.41
Academic Achievement	32	51.81	10.43	75.41	7.35	23.60

The result of table 6 shows the pre-test and post-test scores of students taught Geography using flipped classroom approach. In terms of learning motivation, the result revealed that students who were exposed to flipped classroom approach had a mean score of 47.50 with standard deviation of 6.23 in the pre-test, and a mean score of 65.95 with standard deviation of 9.61 in the post-test. Therefore, the mean gain was 18.41. This implies that, flipped classroom approach significantly improved students' motivation in learning Geography. Similarly, with respect of academic achievement, it was revealed that, students who were exposed to flipped classroom approach had a mean score of 51.81 with standard

deviation of 10.43 in the pre-test, and a mean score of 75.41 with standard deviation of 7.35 in the post-test. Therefore, the mean gain was 23.60. This implies that flipped classroom approach significantly improved students' achievement in the Geography class.

QUALITATIVE DATA ANALYSIS

How does flipped classroom approach influences students' motivation to learn concept of rotation of the earth in a Geography class?

When students were asked to explain how the flipped classroom approach influences their learning motivation in Geography class:

Majority of the student responded: *"We liked that we could watch the videos whenever we wanted, and it is interactive because we can see the earth rotation in reality not in abstraction. In fact, we found it engaging and motivating to learn through this mean than in the classroom learning."*

Majority of the student responded that: *"The video lesson helped us to understand the concept of rotation of the earth far better than when taught in the class through teacher-based method, and we felt more confidence to contribute in classroom discussions than when we are taught without video"*.

Overall, the students responded that they found it enjoyable to learn using this video. They appreciated the flexibility to learn at their own pace, and reviewing video lectures before class better their comprehension of the concept of rotation of the earth. This understanding boosted their confidence and motivated them and made them feel more confident in class to participate in discussions, compare to the traditional lecture method.

How would students describe their academic achievement in flipped classroom approach compare to traditional classroom approach in a Geography class?

When students were asked to describe their academic achievement in flipped classroom approach compare to traditional classroom approach in a Geography class, the following were there responses; Majority of the student responded that: *"we have seen a big difference in our test score compared to scores we had in the past assessments. We think it is because we were more engaged and active with the video than with the Geography notebook."* Students reported that they experienced improved test scores, attributing this to the active learning and practical opportunities offered by the flipped classroom approach when compared to traditional classroom approach.

Majority of the student responded that: *"We think it is because we learned more effectively with the video and used the knowledge learned to response to quiz questions in the class."* This response showed better quality outcome, thanks to the flipped classroom approach's emphasis on learners' engagement with the learning material, which promote motivation and academic achievement.

Based on students' responses, it was discovered that the flipped classroom approach had a positive impact on students' learning motivation and academic achievement in the geography class. By providing

autonomy, improving understanding, enhancing engagement, and promoting active learning, the flipped classroom approach created a supportive and stimulating learning environment.

DISCUSSION

The findings related to the student's learning motivation scores and academic achievement scores show statistical differences. Significantly, differences were found in the mean scores of the experimental and control groups in terms of the two variables under investigation.

In terms of the learning motivation, this study also found that students learning motivation in the experimental group scores was higher than those in the control group. The finding of this study has aligned with the findings of previous studies by Alsancak *et al.* (2018) and Köpeczi-Bócz (2024) which reported that the flipped classroom approach had a moderate effect on learning motivation; Zheng *et al.* (2020) and Koh & Ahn (2023) also discovered that the use of the flipped classroom had a significant impact on the learning motivation of students; and Aidoo *et al.* (2022) which found that the flipped classroom approach had an overall positive effect on students' learning motivation. Perhaps, this can be associated with the fact that the flipped classroom approach offers students the opportunity for home study which prepare their mind before coming to the classroom to complete the assignments. Ganiyu & Olasedidun (2022) discovered that the NCE students taught Educational technology concepts using flipped classroom package achieved better scores than those taught using conventional method. More so, the home study which allows students to revise, memorize the contents (Azubike, 2023); and doing the assignments as a group under the guidance of the teacher can be considered as reasons for more learning motivation in the experimental group (Egara & Mosimege, 2023). Hence, it can be said that the higher motivation level among students is the likely cause of higher achievement in the experimental group.

Furthermore, based on the academic achievement scores of the students who used the flipped classroom approach and those who were taught via the conventional classroom approach, it was revealed that students who were taught with the flipped classroom approach scored higher than those who were taught using the conventional learning approach. This result is in line with the finding of Osuafor and George (2023), which reported a significant difference between groups in terms of academic achievement. The finding is also in tune with the findings in the studies undertaken by Zheng *et al.* (2020) and Ng (2024), which have discovered that students who used the flipped classroom approach were more successful than those taught using the conventional method. This could be a result of the increased learning opportunities that come with the flipped classroom as identified by Chukwuemeka

et al., (2021), Aidoo *et al.*, (2022) and Osuafor and George (2023) which opined that flipped classrooms increase students' interaction with the course material, give immediate feedback and promote individuals' self-learning process. Although many studies in the literature have supported the findings of this study, contrarily some studies found that the flipped classroom approach has little or no positive effect on achievement. The finding of Cabi (2018) is one such study that has disagreed with the findings of this study. The findings showed that the use of the flipped classroom model does not yield significant impacts on increasing the student's academic achievement, as they lack the necessary skills to manipulate devices. Hence, to this set of students, the flipped classroom approach comes with an additional workload.

CONCLUSION

This study investigated the impacts of the flipped classroom approach on students' learning motivation and academic achievements in Geography. Based on the findings of this study which showed significant differences between the scores of experimental and control groups, the researchers therefore concludes that the flipped classroom approach has a positive impact on both students' learning motivation and academic achievement, particularly in learning Geography (concept of rotation of the earth) in secondary schools in Kebbi State, Nigeria.

RECOMMENDATIONS

Based on the findings of this study the following recommendations were offered:

1. Educators should harness the potential of the flipped classroom to foster motivation, engagement, and academic success in their students across all levels of schooling in Kebbi State and Nigeria as a whole.
2. The State and the federal government should provide the needed technologies that will support the full implementation of flipped classroom pedagogy in secondary schools.
3. As most teachers may lack the technical expertise to implement this teaching/learning approach in Kebbi State, the government should provide adequate training for educators to improve their skills on how to effectively integrate flipped classroom technology.

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