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ABSTRACT

The researcher investigated the effect of flipped method on students' achievement in computer science tertiary institutions in Enugu state of Nigeria using quasi-experimental design. The instrument for data collection was pretest - posttest non equivalent control group. The population for the study comprised all higher institutions in Enugu state. Data were collected from a sample of 152 students selected from two secondary higher institutions. A reliability coefficient of 0.89 was obtained from the instrument through test retest. Mean and standard deviation scores were used to answer the research questions, while two-way analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significant. The findings show that students exposed to learning using flipped method achieved higher than those taught with traditional method. It was recommended that ministry of education should revisit the instructional materials used in teaching.

Keywords: flip, achievement, higher institution, learning.

Classification: K.3, K.3.2

Language: English



LJP Copyright ID: 946357

Print ISSN: 2514-863X

Online ISSN: 2514-8648

London Journal of Research in Computer Science and Technology

Volume 17 | Issue 2 | Compilation 1.0



Effect of Flipped Learning on Students' Achievement in Computer Science in Tertiary Institution in Enugu State

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I. Abstract

The researcher investigated the effect of flipped method on students' achievement in computer science tertiary institutions in institution in Enugu state of Nigeria using quasi-experimental design. The instrument for data collection was pretest - posttest non equivalent nonequivalent control group. The population for the study comprised all higher institutions in Enugu state. Data were collected from a sample of 152 students selected from two secondary higher institutions. A reliability coefficient of 0.89 was obtained from the instrument through test retest test-retest. Mean and standard deviation scores were used to answer the research questions, while two-way analysis Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significant. The findings show that students exposed to learning using flipped method achieved higher than those taught with the traditional method. It was recommended that ministry of education should revisit the instructional materials used in teaching.

Keywords: flip, achievement, higher institution, learning.

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II. INTRODUCTION

Traditional teaching methods have dominated classrooms for decades. It is a learning scenario that is teacher-centred and imposes an inflexible lecture style. Lessons are taught by the teacher introducing skills using a blackboard/ whiteboard

accompanied by a verbal explanation. In this situation, learning is associated within the classroom and is often competitive. The lesson content and delivery are considered to be most important, and students master knowledge through drill and practice (such as rote learning). The problem with traditional method is often a matter of pace. Some students, the information may come too slowly or cover what they already know; other students may have trouble taking in information so rapidly, or they may lack the prior knowledge they need in order to understand the concepts. After a hit-or-miss lecture, teachers often assign homework, which many students perform in private mainly with frustration and confusion. Traditional teaching is concerned with the teacher being the controller of the learning environment. Power and responsibility are held by the teacher, and they play the role of instructor (in the form of lecturers) and decision makers with regards to curriculum content and specific outcomes. They see students as people who are hungry for knowledge. In the traditional method, it is the teacher's view that it is the teacher that causes learning to occur (Novak, 1998). It perhaps, explains why it is always difficult for students to understand some topics in computer science.

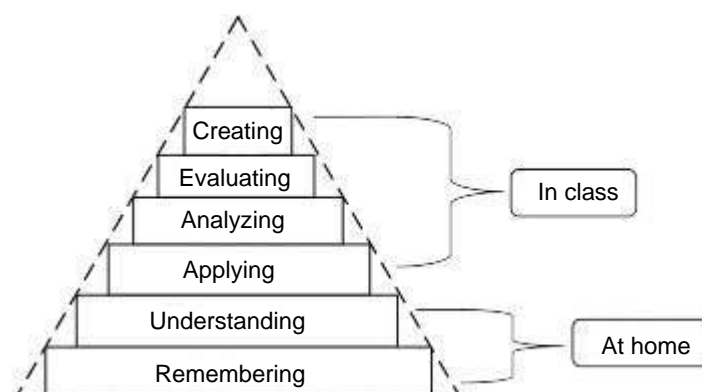
In teaching computer science courses, some topics are so abstract that it requires absolute student engagements in practical. In other parts of the world, students are engaged using several teaching methods in the form of flipped classroom. This is because it allows active learning, student engagement, hybrid course design, and course podcasting. It repositions the

class and students have the ability to interact with one another in practical activities. The instructor coaches or advises and encourages students in individual inquiry and collaborative effort.

Flipped classroom is a type of learning scenario that reverses traditional teaching method and allows students gain first exposure to new material outside the classroom, usually via reading or lecture videos, and then class time is used to do the harder work of assimilating that knowledge through strategies, such as problem-solving, discussion or debates. Bergman and Sams (2012) stated that direct instruction is could be delivered by recording video content for students to engage with before class (and any time) freeing up class time for activities that allow deeper exploration of content. Wikipedia (2016) noted that in a flipped classroom, students watch online lectures, collaborate in online discussions, or carry out research at home and engage in concepts in the classroom with the guidance of a mentor.

According to Knewton infographics (2016), about 69% of students who start high school finishes

four years later while 31% do not finish due to traditional classroom method of teaching. What this suggests is that 7,200 students drop out of high school each day totalling totalling 1.3 million per year. In the flipped classroom, students can get the most out of class time by spending it on practical application, not on inactive lecture (Cole, 2009). Students in this model generally have a more active role and ultimate responsibility for their learning (Gallagher, 2009). They must follow through on viewing the lecture; they must engage during class through a variety of methods. Overmyer (2012) observes that the model is useful where content is usually more technical and linear. Flipped learning is base based on Bloom's revised taxonomy (2001). It this means that students are doing the lower levels of cognitive work (gaining knowledge and comprehension) outside of class, and focusing on the higher forms of cognitive work (application, analysis, synthesis, and/or evaluation) in class, where they have the support of their peers and instructor.



This model contrasts with from the traditional model in which first exposure occurs via lecture in class, with students assimilating knowledge through homework. Through the use of computer technology, flipped learning method captures content for students to access at their own convenience and to suit their pace of learning (e.g. lecture material, readings, interactive multimedia), organises content for students to gather their own resources, presents learning materials in a variety of formats to suit different

learner styles and multimodal learning (e.g. text, videos, audio, multimedia), provides opportunities for discourse and interaction in and out of class (e.g. polling tools, discussion tools, content creation tools), conveys timely information, updates and provides reminders for students (e.g micro-blogging, announcement tools), provides immediate and anonymous feedback for teachers and students (e.g. quizzes, polls) to signal revision points, captures data about students to analyse their progress and

identify 'at risk' students (e.g. analytics). If When this method is employed, it will enhance the way instruction is delivered in tertiary institutions.

As noted by Odo and Odo (2015), tertiary education in Nigeria comprises undergraduate, postgraduate, and vocational training. Usually, an individual needs to be admitted into a college, polytechnic or university to receive tertiary education. It is the most specialized form of education where a particular course of study is taken. Upon completion of the course, an academic degree, diploma or certificate is issued to help make an individual a better human.

On completion of the course, the individual receives an academic degree, diploma or certificate that will help such an individual to be a better human being. The apparent gap between what is acquired in school and the reality of the workspace has to be attributed to poor learning condition caused by the traditional method of instruction. Computer science education is a great enterprise which nations depend on in order to advance technologically. Therefore, this course should receive much emphasis in education because of its significance and relevance to life and society.

However, gender is considered as a factor in this study because it may be that male and female may have differences in achievement when flipped learning is used in teaching. It may be because gender is a biological difference between male and female in their reproduction. Nworgu (2005) noted that there exists gender difference in science achievement. It is from against the above, that the researcher intends to find out the effect of flipped learning method on students' achievement in Computer science.

2.1 Statement of the problem

The persistent use of the traditional method of instruction in this part of the world has adversely affected students' achievement in computer science over the years. It has left students to be passive learners rather than active listeners. This method usually leaves students with nothing but

to note down every word without adequate understanding of the content. This ugly situation will eventually make Nigerian graduates not to be comfortable in the competitive world.

2.2 Purpose of study

The purpose of this study is to determine the effect of flipped learning on students' achievement in computer science in tertiary institutions in Enugu state. Specifically, the study tends to determine;

1. The effect of flipped Method of Instruction (FMI) on students' achievement in computer science.
2. The effect of FMI and Traditional Method of Instruction (TMI) on male and female achievement in computer science.

2.3 Research questions

The following research questions guided the study

1. What is the mean achievement score of student taught with FMI and those taught using traditional method?
2. What is the mean achievement score of male and female student taught with FMI and those taught using the traditional method as measured by Flipped Computer Science Achievement Test (CSAT)?

2.4 Research hypotheses

The three hypotheses tested at 0.05 level of significance:

HO1: There is no significant difference in the mean achievement scores of students taught with FMI and those taught with the traditional method.

HO2: There is no significant difference in the mean achievement score of male and female students taught with FMI and those taught with the traditional method as measured by (FLAT).

HO3: There is no significant difference in the interaction effect of gender and teaching method on the students' means achievement scores.

III. METHODS

Quasi experimental design was used for the study. It utilized pre-test, post-test non-equivalent control group design. This design was used because of non-randomization of subjects. The research subjects were not randomized because of the problems of re-arrangement or re-grouping of intact classes. The population of the study consists of 827 computer science students from all government owned higher institutions in Enugu state. The study has sample size 152 science students consisting of 82 female and 70 male. The study utilized stratified and simple random sampling technique. The sample was stratified into universities, Polytechnics and Colleges of Educations. Then simple random technique was used to select two universities, one polytechnic and one college of education. All the year one computer science class students were used as research subjects in each of the sampled schools. Therefore, in each school, one intact class was assigned to Flipped Method of Instruction (FMI), while the other intact class was assigned a Traditional Method of Instruction (TMI). Database Management Achievement Test (DMAT) was used as instrument for the study. The instrument consisted of 50 multiple choice objective test developed by the researcher. The measuring instrument was based on database management content of qualitative analysis subdivided into data gathering and data grouping tests, tests for actual database development (creation of tables) and tests for query and interface creation and reports. The instrument was validated by three experts, one from computer science and the other two from measurement and evaluation. The reliability of DMAT was determined by administering the test to Ebonyi state university of Nigeria using test retest method. The correlation coefficient of the two sets of scores yielded 0.89 using the Cronbach Alpha statistic for test of internal consistency. All the research questions were answered using mean and 2-way analysis of covariance (ANCOVA) used to test the null hypotheses at 0.05 level of significance.

IV. EXPERIMENTAL PROCEDURE

Regular computer lecturers were used for the study. These lecturers received one week training from the researcher on the use of flipped method of instruction. At the end, they were given a lecture notes as a guide. The instructional methods used for this study are the Flipped Method of Instruction (FMI) and Traditional Method of Instruction (TMI). The FMI was for the experimental group while the TMI was for the control group. In the presentation of the FMI the teacher presented the database management system development procedures which involve the following sub-headings: data gathering and grouping according to relationship, creation of tables i.e. the actual database development, creation of queries, creation of interface (forms) and finally reports. The literature of database management was given to students to go home and assimilate the contents. In the classroom, the teacher used explanation and demonstration to teach students every single step involved in development of database management system from simple to complex. On the other hand, the instructional method used for TMI includes content development, teachers' activities, and students' activities. The research subjects were given pretest to both FMI group and TMI group. The teaching commenced on the two groups and after administering the pretest, the treatment lasted for a period of four weeks after which a posttest was administered to the research subjects. The pretest was reshuffled and printed with a different colour of question paper to give the questions a different look, before it was used for the posttest. The course lecturer did the supervision. The Data collected for pretest and posttest for the two groups were used to answer the research questions and test the hypotheses.

V. RESULTS

Data from Table I indicates that the group taught with Flipped method of instruction (FMI) obtained the mean score of 45.39 for the pretest and the mean score of 83.55 for the post-test.

Table I: Mean Ratings of the Responses on the Effect of Flipped Method on Students Achievement in Computer Science. N = 152

Group	Pre-test		Post-test		N = 152
	Mean	SD	Mean	SD	
SMI	45.39	8.62	83.55	9.28	77
TMI	40.05	9.29	56.00	6.50	75

However, TMI obtained the mean score of 40.05 and 56.00 for the pretest and posttest respectively. Therefore, the mean score for students exposed to FMI is higher than that of TMI. This shows that students taught with FMI method perform better in the subject than students taught using the traditional method.

Table II: Mean Ratings of the Responses on the Achievement Score of Male and Female Students Taught using Fmi and those Taught using Tmi as Measured by Database Management Achievement Test (dmat).

Group	Pre-test		Post-test		N = 152
	Mean	SD	Mean	SD	
SMI	45.39	8.62	83.55	9.28	77
TMI	40.05	9.29	56.00	6.50	75

Table 2 indicates that male students achieved higher result (70.80 pre-test) and (82.70 post-test) than their female counterpart with 65.10 and 70.95 in pre-test and post-test respectively when exposed to FMI. Male students achieved higher result 45.40 in pre-test and 48.41 post-test while female had 41.09 and 45.80 in pre-test and post-test respectively when TMI was used. The table showed that both male and female student's achievement increased in the subject when FMI was used in teaching than traditional method.

Table III: ANCOVA on interaction effect of students' mean achievement scores by instructional method and gender.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	445.568 ^a	5	89.114	2.720	.000
Intercept	130.606	1	130.606	717.605	.000
GROUP	6.893	1	6.893	9.646	.002
POSTTEST	322.709	1	322.709	3.434	.000
METHODS	0.411	1	0.411	1.013	.001
GENDER	15.205	1	15.205	1.480	.001
METHODS * GENDER	116.765	1	116.765	4.688	.001
Error	411.590	149	31.661		
Total	101525.000	152			
Corrected Total	857.158	151			

For H_{01} , the data in table 3 indicates that the method is significant at 0.001, which is less than 0.05 set for the study. Since the computed level of significance is less, the H_{01} is rejected. It is concluded that there is a significant difference between the mean achievement scores of students exposed to FMI than those taught with TMI.

For H_{02} , table 3 showed that gender is significant at 0.001, which is less than 0.05 set for the study. This implies a rejection of the null hypothesis. Hence, there is a significant difference in the achievement of male and female students exposed to FMI as measured by Database Management Achievement Test (DMAT)

VI. SUMMARY OF THE FINDINGS

1. Students that are exposed with FMI achieve higher in the computer science course (Database management) than those taught with TMI.
2. Both male and female students put learn better when exposed to FMI.
3. There is a significant difference in the mean achievement of students based on the method of instruction and gender.

VII. DISCUSSION

The study generated information on the effect of flipped method on student's achievement in computer science in tertiary institutions in Enugu, Nigeria. The finding pertaining to research question 1 revealed that students taught with FMI show greater achievement in computer science than those taught with TMI. The findings are in line with Cole (2009) who noted that the students can get the most out of class time by spending it on practical application, not on inactive lecture. The findings is also in line with Gallagher, (2009) who noted that in flipped learning, students have a more active role and ultimate responsibility for their learning.

For research question two which sought to find the influence of FMI on male and female students in programming language. The findings revealed

that there is a difference in favour of SMI. This means that both male and female students achieve higher when exposed to FMI and this is in line with Fabunmi (2004), who discovered that gender composition has a significant relationship with students' academic performance.

For hypothesis one and two, the findings revealed that method and gender is significant. There is a significant difference in the mean score of students taught with FMI and those taught with TMI. The researcher is of the view that FMI helps to create meaningful learning, encourage students to take responsibility for their learning, learn at their own pace, deepen their knowledge and understanding and also make faster progress.

VIII. EDUCATIONAL IMPLICATIONS

In Africa especially in Nigeria, teaching and learning are still carried out using traditional methods of chalk and blackboard. There is no access to modern technology. This is as a result of misdirected attention of stakeholders to issues of quality education for the citizens. As a result, school system is plagued with numerous social vices like examination malpractices; cultism; and infant hooliganism.

IX. RECOMMENDATIONS

1. The Ministry of Education in Nigeria should revisit the instructional methods.
2. Teachers should strive to change from the traditional method of instruction and avail themselves of the opportunity to learn new technology of teaching.

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