

**DEMONSTRATION BASED FLIPPED CLASSROOM AND IT'S EFFECT ON
SCIENCE EDUCATION STUDENTS' LEARNING OUTCOME IN
MICROTEACHING IN ANYIGBA**

By

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Abstract

This study examined the effect of demonstration based flipped classroom (DBFC) on the learning outcome of science education students of Prince Abubakar Audu University, Anyigba in micro teaching and the influence of gender on their post-test achievement (PP) and retention achievement (RP). The quasi-experimental design was employed. Three research instruments were used as follows: developed demonstration based flipped classroom DBFC; lesson note and achievement test. The instruments were validated and tested with the reliability index of 0.78, 0.85 and 0.95 respectively. Hypotheses formulated were tested using (ANCOVA). The findings of this study revealed that: (i) developed demonstration based flipped classroom DBFC was effective and a significant difference exist in the PP $F(1,265) = 142.002, p=.00$ and RP $F(1, 265) = 130.24, p = .00$ of students since the p -values $0.00 < 0.05$ alpha value which favored the DFCEP and (ii) no significant difference existed in the post-test achievement and retention achievement of both male and female students in DFCEP. The study concluded that demonstration flipped classroom package improved students' achievement in Microteaching. It was therefore recommended among others that the use of demonstration based flipped classrooms be encouraged in other educational courses for a significant improvement in students learning outcome in Nigerian universities.

Keywords: demonstration, flipped classroom, learning outcome, retention

Introduction

The Nigerian National Policy on Education (FRN, 2015), stipulates among others that education should sustain citizens and the society at large in consonance with the realities of the immediate environment and the modern world. Today's world, no doubt is a global world due to technology and education has since fall in line with technological advancement across the globe. The level of educational advancement of any nation today is influenced by the speed and growth level of her information and communication technology (ICT) sector. ICT has played a significant role as a tool in the choice of utilizing suitable strategies to achieve instructional goals that is to measure up with the aspiration of every country. One of such technological tools is the Flipped classroom models of instruction which is innovative in character, it has no universal definition but the term 'flipped classroom' connote that a pre-recorded lectures (video or audio) followed by class activities is given to students to enhance their learning outcome. Students view these audios or videos outside the classroom before or

after coming to classroom, and the class activity is centred or devoted to interactive modules such as; discussions, exercises or quiz, questions and answer sessions, or any other learning activities.

Flipped classrooms are sometimes called “inverted classrooms” because it is able to transform learning outside the four walls of the classroom to outdoor or home activities and move the conventional homework activities into the classroom. Lynch and Zenchack, (2002) posited that flipped classroom provide the opportunity for students to carry out research at home and engage in concepts in the classroom with the guidance of a mentor. In the same vain, Bergmann and Sams, (2012) were of the view that flipped classroom is a conjoined learning model that brings basic content out of the planned class time for learners to study freely, allowing educator to involve students in group discussions and interactive learning activities during the lesson period in the class to promote higher-level thinking. Bergmann and Sams (2012) explains further that flipped classroom bring to learners a lot of succors and provide opportunity to those students who missed classes, as they can watch the videos or listen to the audio of the lessons at their convenient time at home and still be able to catch up with the class activities.

Similarly, Ronchetti (2010) pointed to the methodology in higher institution that involves teacher development of recorded video lectures usually given to students to watch and study outside of the classroom. The flipped classroom is a mixture approach to learning, using technology to move lecture to homework and using face-to-face classroom time for interactive class activities. Classroom time now meant for discussion, exercises, or other activities to boost the usage of skill. It can be said that flipped classroom has helped lecturers in bringing technology into the students’ learning environment and equally promotes a self-directed learning practice. Likewise, Fulton (2012) enumerated several benefits flipped classroom to include: Students work at will, pace and doing assignment in class gives teacher best insight into difficulties and learning styles of students, Lecturers can more easily customise and revise the syllabus and provide it to students 24 hours per day and 7 days per week while classroom time can be effectively used, Lecturers applying this method report seeing good students’ achievement and interest because learning theories support the latest techniques and Flipped classroom makes use of technology which is flexible and appropriate for present learning situation. Examples of flipped classroom models are; the standard-inverted, rotational, enriched-virtual and demonstration based flipped classroom models.

Micro teaching skills are complex in terms of structure and implementation, as such, different strategies and procedure are to be employed in delivering the content to would be teachers instead of the classroom that are driven usually by “teacher talk”.

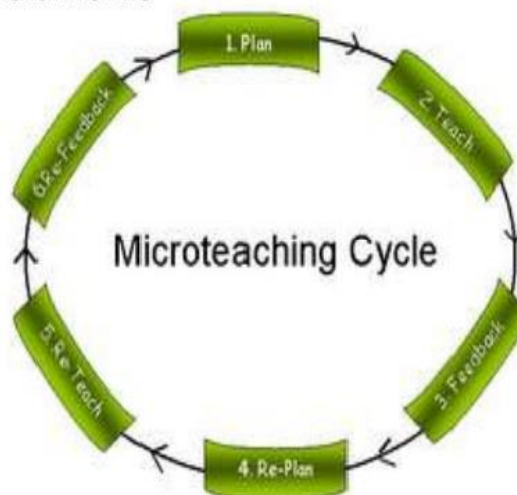
Learning outcomes in this study are regarded as achievement and retention. Achievement is the numerical scores obtained by the student after a series of lesson in flipped or traditional lecture method, therefore, test of achievement are used to determine what the learner has learnt in a lesson which is influenced by their level of mastery and retention. Retention is the ability of a student to remember things learnt after a period of time whenever it is required. Another factor influencing Microteaching learning has been marked as students’ retention. Hornby (2001) described retention as the ability of a student to remember things learnt after a period of time. It also helps the successful application of knowledge learned in other subject areas. If the retentive ability of students is poor, lecturers will use most class time reviewing and re-teaching the same concepts. Marcellious (2001) indicated that in today’s classroom, one of the most important factors is retention of concepts that are taught to the students. Chianson (2008) posited that retention in Microteaching is not only acquired by students through rote-learning but through appropriate teaching methods.

Study by Charles-Ogan and Williams (2015) reveals that there was a significant difference in pretest-posttest scores of students in the flipped classroom when comparing achievement using offline Video CD recorded by the teacher with conventional classroom students in Microteaching in River State, Nigeria which is in favour of flipped classroom. Also, Esperanza et-al, (2016) opined that the use of flipped classroom model resulted in gains in student achievement generally.

Microteaching is a teacher education technique which allows teachers to apply clearly defined teaching skills to carefully prepared lessons in a planned series of 5-10 minutes encounter with a small group of real students often with an opportunity to observe the results on video tape (Buch, 1968). Micro-teaching is a teacher training and faculty development technique whereby the teacher reviews a recording of a teaching session, in order to get constructive feedback from peers and/or students about what has worked and what improvements can be made to their teaching technique. The art of teaching does not merely involve a simple transfer of knowledge from one to other. Instead, it is a complex process that facilitates and influences the process of learning. Quality of a teacher is estimated on how much the students understand from his/her teaching (Buch, 1968). The classrooms cannot be used as a learning platform for acquiring primary teaching skills. Training of medical teachers in specific teaching skills is a major challenge in medical education programs. The pedagogic skill for teaching can be acquired only through more structured and cheaper faculty training techniques.

Fig- 1- Steps

STEPS /CYCLE OF MICROTEACHING



1. Plan - It involves selection of the topic and related content, the activities are planned in a logical sequence and reparation of the micro lesson plan
2. Teach - It involves the attempts of the teacher trainee to use the components of the skill in suitable situations, the teacher should have courage and confidence to handle the situations arise in the class effectively. timing should be 5 minutes, can be recorded in a tape recorder or on a videotape
3. Feedback - It refers to giving information to the teacher trainee about his performance, this information includes the points of strengths as well as weakness relating to his or her performance, it help teacher trainee to improve his or her performance in the desired direction, feedback can be provided by audiotape or videotape recorder

4. Re-plan - The teacher trainee re-plans his lesson incorporating the points of strength and removing the points not skillfully handled during teaching in the previous attempts either on the same topic or on another topic suiting the teacher trainee for improvement.
5. Re-teach- This involves teaching the same group of students if the topic is changed or a different group of students if the topic is same, the teacher trainee teaches the class with renewed courage and confidence to perform better than previous attempt.
6. Re-feedback - It is the most important component of micro-teaching for behavior modification of the teacher trainee in the desired direction in each and every skill practice, it is again provided on the re-taught lesson.

The theories of cognitive conflict and constructivism of Piaget (1967) form the framework of this study; they identify Achievement and Retention as the main dependent variables while flipped classroom and traditional classroom were considered as independent variables in the flipped classroom model. The outcome of this study will help ease the phobia and lack of preparedness would be teachers usually faced when set for teaching practice exercise and improve student utilization of technology for learning process. The outcome of this study may equally serve as a useful guide to Nigerian tertiary institutions intending to adopt Flipped Classrooms in Microteaching and other educational courses that are complex and practical based.

Statement of the Study

The traditional lecture methods in most cases do not measure up with the needs of the learners, because of their diversity with different learning styles and challenges, in order to prepare the would be lecturers for effective learning in Microteaching, effective time utilization and class management must be ascertain to ensure coverage of activities and practices in the area of teaching which in most usually cases, the traditional lecture method cannot offer as such, would be lecturers are left to their fate hanging going to teaching practice without experiencing teaching in a small scale which result into poor achievement record for the would be lecturers.

Since the quest for innovative teaching strategies has been on the high increase to take care of the individual learners and learning difficulties, and incidentally, the digital natives are accustomed to the use of digital platforms for their daily needs, it becomes very imperative to integrate technologies like flipped classroom into teaching and learning process. It is on this premise; this study examined the effect of demonstration based flipped classroom (DFCP) on science education students learning outcome in Microteaching of Prince Abubakar Audu University, Anyigba

Purpose of the Study

The main purpose of this study was to examine the effect of Demonstration Based Flipped Classroom Package (DFCP) on the learning outcome of Science Education students of Prince Abubakar Audu University Anyigba in Microteaching. The specific objectives are to:

1. examine the difference in the post-test achievement of students taught Microteaching using the Demonstration Based Flipped Classroom Package (DFCP) and those taught using the Traditional lecture method (TLM).
2. determine the difference between the retention scores of students taught Microteaching using the Demonstration Based Flipped Classroom Package (DFCP) and those taught using the Traditional lecture method (TLM).

Research Questions

The following research questions guided the study:

1. What are the differences in the post-test achievement of students taught Microteaching using the Demonstration Based Flipped Classroom Package (DFCP) and those taught using the TL Method during the second semester?
2. What are the differences between the retention achievement scores of students taught Microteaching using the Demonstration Based Flipped Classroom Package (DFCP) and those taught using the TL Method during the second semester?

Research Hypotheses

The following null hypotheses were tested:

1. There is no significant difference between the post-test achievement of students taught Microteaching using a developed (DFCP) and those taught using the TL Method.
2. There is no significant difference between the retention achievement scores of students taught Microteaching using a developed (DFCP) and those taught using the TL Method.

Methodology

This study employed quasi-experimental design. The population of the study consisted of all Science Education students of the Faculty of Education, Prince Abubakar Audu University, Anyigba. Purposive sampling technique was used to select (40 experimental group and 40 control group) of Science Education students of PAAU, Anyigba. The instruments used: (i) a researcher developed Demonstration Flipped Classroom Package (DFCP); (ii) Microteaching Achievement Test (MAT); and (iii) Lecture Notes (LN). The instruments were validated by three experts and were tested for reliability which yielded, 0.85 0.78 and 0.95 respectively. Test-retest method was used during and after the experiment to determine the retention of the students. The researcher with two research assistants administered the MAT instrument. Two research questions were raised and answered along with their hypotheses at 0.05 level of significance using ANCOVA. The use of ANCOVA was to control for the differences between groups as revealed in the pre-test.

Results

Research Question one: What is the achievement score of student taught with Developed Demonstration Flipped Classroom and student taught with Lecture Method?

Table 1: -

Mean (x) and Standard Deviation (SD) Scores of Students' Mean Achievement Scores in Microteaching

Group	N	Pre-test		Post-test		Mean gain score	
		SD ₁	\bar{x}	SD ₁	\bar{x}	SD ₁	\bar{x}
Experimental	40	1.3	5.90	1.8	12.98	7.08	
Control	40	1.5	7.08	1.35	8.88	1.80	

Note: N= number of student, SD₁= standard deviation for pretest, SD₂= standard deviation for posttest, X = mean

The data on students' achievement in Table 1 revealed that students taught Microteaching using Developed Demonstration Flipped Classroom had mean score of 12.98 with standard deviation of 1.89 while the mean achievement score of students taught without Developed Demonstration Flipped Classroom was 8.88 with standard deviation of 1.35. Also the experimental group had a gain score of 7.08 over the control group who had a gain score 1.80. Therefore Students taught Microteaching using Developed Demonstration Flipped Classroom performed better than students taught with lecture method.

Research Question two: What is the retention achievement score of micro-teaching student taught with Developed Demonstration Flipped Classroom and student taught with lecture method?

Table 2:

Mean and Standard Deviation of Retention Achievement Score of Micro-Teaching Student taught with Developed Demonstration Flipped Classroom and Student taught with Lecture Method

Groups	Pretest			Posttest		Mean gain
	N	\bar{x}	SD	\bar{x}	SD	
Exp. (Developed Demon. Flipped Classroom)	40	50.38	4.56	58.75	3.19	8.37
Cont. (Lecture Method)	40	53.86	3.38	56.14	3.84	2.28

Result on Table 2 shows the pretest and posttest retention achievement score of micro-teaching student taught with Developed Demonstration Flipped Classroom (Experimental) and student taught with lecture method (Control). The result of the study shows that students who were taught micro-teaching using Developed Demonstration Flipped Classroom had mean retention score of 50.38 with standard deviation of 4.56 in the pretest and mean retention score of 58.75 with a standard deviation of 3.19 in the posttest. Those who were taught using lecture method had mean retention score of 53.86 with a standard deviation of 3.38 in the pretest and mean retention score of 56.14 with a standard deviation of 3.84 in the posttest. Standard deviation scores of 3.19 for the experimental group and 3.84 for the control group imply that the scores of the experimental group were close to each other than the scores of the control group. Mean gain score of 8.37 and 2.28 for the experimental and control groups respectively imply that Developed Demonstration Flipped Classroom had more retention achievement score than those taught using lecture method.

Hypotheses One: The achievement mean scores of students will not be significantly different in the experimental and control group.

Table 3:

Analysis of Covariance of Students' Mean Achievement Scores in Microteaching

Sources of Variation	Sum of Squares	Df	Mean Square	F	Sig
Corrected model	11713.487	2	2913.372	38.258	
Intercept	2623.714	1	2623.714	33.669	
Pretest	8974.333	1	8974.333	137.996	
Method	2148.256	1	2148.256	25.311	
Error	5744.501	37	37.00	.937	
Total	42933.000	40			
Corrected total	1657.987	39			

Data in table 2 showed that there is a significant mean effect for mode of instruction on students achievement in microteaching $f(1, 80) p < .05$. The null hypothesis therefore was rejected, indicating that there was significance difference in the mean achievement score of microteaching students taught with Developed Demonstration Flipped Classroom than those taught with lecture method.

Hypotheses 2: There is no significant different between the retention achievement mean scores of students taught with Developed Demonstration Flipped Classroom and those taught with lecture method.

Table 4:

Analysis of Covariance (ANCOVA) of students' Retention Achievement Score in Developed Demonstration Flipped Classroom and student taught with Lecture Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3037.067 ^a	2	1518.533	20.246	.000
Intercept	12618.687	1	12618.687	168.236	.000
Pretest Scores	516.910	1	516.910	6.892	.010
Groups* Reten.	2367.845	1	2367.845	31.569	.000
Error	11775.927	37	37.006		
Total	653765.000	40			
Corrected Total	14812.994	39			

a. R Squared = .205 (Adjusted R Squared = .195)

The result in Table 4 shows the retention achievement mean scores of students taught with Developed Demonstration Flipped Classroom and those taught with lecture method, an F-ratio of 31.569 was obtained with associated exact probability value of 0.00. Since the associated probability value (0.00) was less than 0.05 set as bench mark, the null hypothesis (H_{02}) which stated that there is no significant difference between the retention achievements mean scores of students taught with Developed Demonstration Flipped Classroom and those

taught with lecture method was rejected. Thus, inference drawn is that, there was a significant difference in the mean achievement scores of students taught with Developed Demonstration Flipped Classroom and those taught with lecture method. The result implied that students taught using Developed Demonstration Flipped Classroom have higher mean in the posttest.

Discussion

The findings of the study corroborated earlier assertions of Charles-Ogan and Williams (2015) which reveals that there was a significant difference in pretest-posttest scores in favour of the flipped classroom when comparing achievement using offline Video CD recorded by the teacher with conventional classroom students in Microteaching in River State, Nigeria. This is also in consistent with the active learning studies which found that flipped classroom resulted in general improvement in academic achievement effect in Microteaching activities and problem solving (Fulton, 2012). Also, the results were in conformity with Esperanza, Fabian and Toto (2016) who revealed that the use of flipped classroom model had resulted in gains in student performance. This study also agreed with the earlier finding of Marcellious (2001) which indicated that in today's classroom, one of the most important factors is retention of concepts that are taught to the students. It was added that without retention, there cannot be a successful transfer of knowledge from one subject area to another. Also in agreement with Chianson (2008) that retention in Microteaching is not acquired by mere rote memorisation but through appropriate teaching method like flipped classroom.

Conclusions

This study revealed that the flipped classroom strategy of teaching facilitated learning as it improved the post-test achievement scores and high retention scores of students in Microteaching when compared with their counterparts in traditional lecture classroom. This revelation posited that there is an urgent need for flipped classroom learning approach to address the poor achievement of students in Microteaching, in order to promote quality teachers education in Nigeria, since it is to expose would be teachers to the profession.

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. Lecturers should adopt the demonstration flipped classroom approach in totality because it is a student-centred learning strategy that engages the students rather than spoon-feed.
2. All stakeholders in the education industry should see flipped classroom as an innovation which must be accepted and adopted as a good strategy to learning in Nigeria.

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