
The Use of Flipped Learning Model in Enhancing Critical Thinking Skills Among Nigerian Students

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ABSTRACT: *The study investigated the use of flipped learning model in enhancing critical thinking skills among Nigerian students. The study utilised a non-randomised pretest-posttest quasi-experimental design. A sample of 153 NCE II students studying Primary Education was drawn from a population of 456 across schools of arts, college of education, Oju, Benue State using stratified sampling technique. The instruments for data collection, CTST which gave reliability coefficients of 0.81 was obtained using Kuder-Richardson (KR₂₀) and Cronbach Alpha. One research question was stated and answered using mean and standard deviation while one null hypothesis was stated and tested using ANCOVA at 0.05 level of significance. The findings of the study revealed that there was a significant difference between critical thinking skills scores ($P = 0.00 < 0.05$) of the experimental and control groups. Based on the findings, it was concluded that flipped learning model has enhanced students' critical thinking skills scores better than conventional method. It was therefore, recommended that school proprietors and governments should support the use of flipped model innovation.*

KEY WORDS: flipped learning, critical thinking skills, primary education

INTRODUCTION

The education as a veritable tool for transmission of societal values and skills is not only the *sine qua non* but the nucleus of other spheres of life where the crisis of low academic outcomes is mostly debated. In the quest for what could result in low students' academic outcomes, the outcry for paradigm shift in how we teach and what we teach, have become evident. One prominent approach being identified is the need to shift teaching from knowledge to skills-centered. This necessitated the proposition of flipped learning model where critical thinking skills such as analysis, evaluation, synthesis, observation, communication among others can be instilled into learners. These skills can only be developed through effective knowledge of subjects which can be achieved through adaptation to innovative pedagogies that can enculture these and other 21st Century skills in the students.

Education as a discipline concerns with sharing of contents, process skills, attitudes, theories, and other accumulated body of knowledge with learners. It is therefore, necessary that they are groomed with critical thinking skills that can help them succeed in the challenging world with untold poverty and high unemployment rate. This could be why the 21st Century training requires

a holistic and quality education that can mold students to become a comprehensive and global citizen with lifelong thinking and self-sufficiency skills. In this regards, it is pertinent to empower learners with learning and innovation skills; Information and Communication Technology (ICT) skills; life-skills, especially critical thinking in order to live well in the globalised world (Morgan, 2014; Nichols, 2010; Stone, 2012).

To achieve these lofty dreams of global education, adaptation to innovative teaching and learning models should be considered as priority to be pursued with vigour. Instead of caging students under the control of authority figure for hours listening to one-way form of communication through traditional teaching, it should be rather advantageous to teach them how to expend time on interactive activities in the classroom using technology-driven models like flipped learning (Pustaka, Bergman & Sams, 2012). These activities bring more values to learners. For this reason, teachers should try to explore and apply information technology, though the flexible use of this active teaching method in classrooms is still a puzzle game in the face of many teachers who are ICT-phobic, particularly in Nigerian schools. The nagging challenge is that, many teachers find it hard to use modern and active learning methods in the classroom seemingly because they are accustomed to traditional teaching. This problem could be addressed by the adoption of models like flipped learning that can enhance the development of critical thinking skills among learners.

In an effort to overcome the challenge of ineffective teaching method, the concept of the flipped model was proposed in 2000 to meet different learning needs of learners. By way of definition, flipped learning model is a technology-driven approach to teaching and learning in form of video packages in which the conventional notion of classroom-based learning is inverted, so that students are introduced to the learning material before class, with classroom time being used to deepen understanding through discussion with peers and problem-solving activities facilitated by teachers (Sayah, Haryni & Wijayati, 2016). In flipped teaching, teachers assign lessons in advance to students through pre-designed lectures provided in videos, software or online, then in classroom, teachers support individuals or groups of 5, 7, 9, 11, 13, 15 and so to solve problems. Means, Toyama, Murphy, Bakia, and Jones (2010) report a significant difference in learning outcomes. The researchers buttressed that flipped classroom has created a deep learning environment as well as the development of learning skills. This model helps to create an environment that promotes learning autonomy, giving learners ample opportunities to learn at their own pace to become responsible for knowledge-building rather than passive learning (Morgan, 2014; Nichols, 2010; Stone, 2012).

Critical thinking as the major variable in this study is the process of reviewing every aspect of the problem and coming to a conclusion to solve it. It is thinking about learning materials, concepts, theories, and principles including reviewing, verifying their accuracy and evaluating them to accept or reject them. Critical thinking is fostered in classrooms by opportunities to engage students in critique, argumentation, discussion, and questioning (Osborne, 2014; Azza & Shima, 2018). Critical thinking skills include but not limited to analysis, synthesis, evaluation,

observation, communication and interpretation. These skills do not only help to build students' understanding of subjects, but also play a key role in developing their ability to reason scientifically. This study compared the interactive effects of flipped learning model on NCE II students' critical thinking skills.

Statement of the Problem

Despite unrelenting efforts by educators in developing improved methods of instruction as well as nagging worries about the continued usage of archaic strategies for teaching in Nigeria, it is however, observed that teachers are recalcitrantly taught students in theory and abstraction with teacher-centric traditional methods like lecture and expository methods characterised by chalk-and-talk and rote learning mainly for the purpose of examination and certification. The effects of this are disgraceful learning outcomes, particularly lack of critical thinking skills among male and female students.

Flipped learning model would hopefully fill this gap; since the model is hypothesised to enhance students' learning outcomes through individualised and collaborative instruction. One may ask: Are students' critical thinking skills dependent on instructional model? This study sought to address this question. The problem of this study therefore, was to explore whether flipped learning model has the power to enhance or inhibit students' critical thinking skills in primary education in Nigeria.

Research Question

The following research questions were raised and answered in the study:

What is the difference between the mean critical thinking skills scores of the students taught dynamics using flipped learning model and those taught with expository method?

Hypothesis

The following null hypotheses were formulated and tested at 0.05 level significance:

Ho. There is no significant difference between the mean critical thinking skills scores of the students taught dynamics using flipped learning model and those taught with expository method.

METHODOLOGY

The study adopted a non-randomised pretest-posttest quasi-experimental design. Both the experimental and control groups received the same treatment and assessment's contents on dynamics. The selected contents for the treatment were work, energy and power. One research questions was stated and analysed using mean and standard deviation; and Analysis of Covariance (ANCOVA) was used to test the hypothesis at 0.05 level of significance. A sample of 153 comprising drawn from a population of 456 were selected using stratified sampling technique. Some students were assigned to experimental group who were taught with flipped learning model while other students were assigned to control group who were taught with expository method.

A instrument, Critical Thinking Skills Test (CTST) developed by the researcher having reliability coefficients of 0.81 was used for data collection. The CTST consisted of 30 items multiple choice questions with allocation of 30 marks; and 10 alternative to practical essay questions with allocation of 70 marks. The test which lasted for 60 minutes has a total of 100 marks. The control group took their test using paper and pencil mode while the experimental group took theirs using dedicated video.

Using test-retest, the two groups were pretested to determine the entry knowledge of the students as well as to obtain the reliability coefficients of the instruments. After six weeks of treatment, a posttest was administered at its end and the scores recorded again. These scores were then used for reliability analyses of the instruments using Kuder Richardson (KR₂₀). The entire study lasted for six weeks. To collect the data efficiently using CTST, four research assistants were recruited and trained for two days who in turn assisted the researcher in teaching the content, administered the pretest and posttest and collected the data for further analysis.

Data Analysis and Results

Under this section, the data collected and collated for the study were analysed and interpreted as follows:

Research Question

What is the difference between the mean critical thinking skills scores of the students taught dynamics using flipped model and those taught with expository method?

Table 1: Mean and Standard Deviation of Students in Flipped and exposition strategies

Critical Thinking Skills	Experimental Group				Control Group			
	Pretest		Posttest		Pretest		Posttest	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Evaluation	8.50	0.98	11.30	0.95	8.50	1.00	9.30	0.65
Problem-Solving	7.50	0.70	10.45	0.70	7.50	0.91	9.45	0.90
Observation	6.70	0.90	9.78	0.90	6.70	0.76	4.70	0.30
Analysis	8.09	1.33	11.90	1.53	8.09	1.35	8.91	0.34
Interference	7.34	1.55	12.07	1.55	7.34	1.61	3.00	0.35
Coomminicaton	6.87	0.23	11.00	0.53	6.87	0.71	7.03	0.67
Creativity	7.98	0.34	10.08	1.34	7.98	0.74	6.01	0.56
Mean Summary	63.28	8.05	81.33	9.05	63.28	6.05	55.60	0.67

Table 1 reveals that, in pretest, the mean summary of students' scores in the experimental group was 63.28 with a standard deviation of 8.05 while that of control group was 63.28 with a standard deviation of 6.05. The mean difference between the two groups was 0.89; meaning that

the students were of close cognitive levels before the treatment because the mean difference was considered small.

In posttest, the mean critical thinking scores of 81.33 with a standard deviation of 9.05 in experimental group compared with the mean of 55.60 with a standard deviation of 0.67 in control group showed that the mean difference is 5.93. This showed that experimental group had higher critical thinking scores than their control group counterparts.

Hypothesis

There is no significant difference between the mean critical thinking skills scores of the students taught dynamics using flipped model and those taught with expository method.

Table 2: ANCOVA Test of students' Critical Thinking Skills

Dependent Variable: posttest

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	866.155 ^a	2	433.077	43.314	.000	.425
Intercept	2182.760	1	2182.760	218.307	.000	.651
Pretest	7.480	1	7.480	.748	.389	.006
Method	863.068	1	863.068	86.319	.000	.425
Error	1169.837	150	9.999			
Total	55757.000	153				
Corrected Total	2035.992	152				

a. R Squared = .425 (Adjusted R Squared = .416)

The result in Table 2 shows one-way ANCOVA test of students' critical thinking skills scores in the experimental and control groups. Students' pretest scores were used as covariate to control the initial difference in the two groups. This result reveals that $F_{1, 102} = 86.319$, $P = .000 < .05$ for the main treatment. The significant value P -value (.00) was less than the set significant value of the study ($P < .05$). Therefore, the null hypothesis which stated that, there is no significant difference in the mean critical thinking skills scores of the students taught using flipped learning model and those taught by conventional strategy was rejected.

DISCUSSION OF FINDINGS

The purpose of this study was to determine the interactive effects of flipped learning model on students' critical thinking skills. Based on the result of the data analysis, there was a significant statistical difference in skills acquisition between the students taught the concept of work, energy and power using flipped learning model and their peers taught the same content using expository method. Thus, the experimental group acquired higher critical thinking skills scores than their

control counterparts taught the same content. This finding was supported by the study by Means, Toyama, Murphy, Bakia and Jones (2010) who established that there was significant difference in the learning outcomes of learners when taught with flipped technology. This is buttressed that flipped classroom has created a deep learning environment as well as the development of learning skills (Morgan, 2014; Nichols, 2010; Stone, 2012).

The implication of this is that, the flipped model enabled students to be familiar with concepts outside the classroom by watching educational videos and PowerPoint presentations prepared by teachers. Inside the classroom, teachers took advantage of class time to discuss the appeared ideas. This enhanced thinking, collaborative learning and provided different student-centered activities. Thus, the method promoted skills of analysis, evaluation, problem-solving, observation, communication, inference and creativity better than the expository method. This is in consonance with the finding of Das, Das and Kashyap (2016); and Martino and Zan (2010) who found that the model is important because it supported students' participation in deep learning. This is because learning at one's own convenience gives courage and confidence as students repeat learning process as many times as possible even if they fail at first attempt. The use of technology-driven strategy enabled the students to really understand the concept and thus, rote learning is discouraged.

CONCLUSION AND RECOMMENDATIONS

The major thrust of this study was the development of flipped learning model that can fill the wide performance gaps in terms of lack of critical thinking skills among students due to the continued usage of ineffective instruction. From the result of the analysis, the students taught using the flipped model acquired higher critical thinking skills and confidence than their counterparts who were taught with conventional method.

Based on these findings, it was recommended that:

1. School proprietors, governments and non-governmental organization (NGOs) should provide adequate and dependable flipped tools such as educational apps, websites, projectors, Wifi, tablets, high speed internet connection, flipped boards, routers and other digital facilities to enable teachers integrate flipped learning model into everyday teaching and learning, since it is a factor in students' learning.
2. While science teachers are encouraged to embrace and adapt to modern trends in scientific and technological advancement, schools should integrate flipped learning effectively into their systems because the world is becoming more technologically inclined.

Contributions to Knowledge

Based on the findings of this research, the following contributions to knowledge banks were made:

1. The study established that flipped learning model has positive effects on students' critical thinking skills.

2. This study has provided useful information on the needs to encourage teachers and pupils to adapt to innovations and trends in science and technology education.

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