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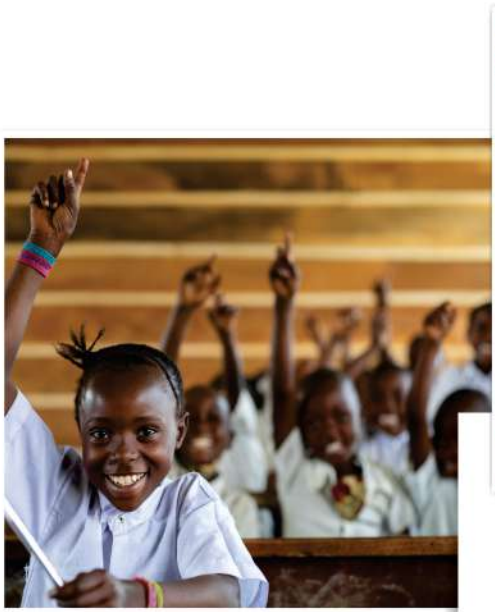
INNOVATIVE STRATEGIES FOR TEACHING VOCATIONAL, SCIENCE, TECHNOLOGY AND MATHEMATICS EDUCATION: CLASSROOM PRACTICES



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PREFACE

The electronic book (e-book) acknowledges that traditional methods in Vocational, Science, Technology and Mathematics Education: Classroom Practices may not be sufficient to equip students with the necessary skills for a rapidly evolving technological landscape.

Therefore, it advocates for the adoption of Innovative teaching approaches that promote a more dynamic and effective learning experience.

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FOREWORD

This book entitled "**Innovative Strategies for Teaching Vocational, Science, Technology and Mathematics Education: Classroom Practices",** is a book of readings on various innovative classroom pedagogies. It is a welcome literature for Education System and a very important resource book for teachers who are functioning in the disciplines of Vocational Education, Science, Mathematics and Technology education and training. It is a compendium of most of the **active learning strategies** aimed at producing graduates who have been prepared for adaptation to the conditions of the 21st century world of fluidity. The 21st century world accommodates soft skills which the individual can edit from time to time as the conditions of socio-cultural, economic and technological environments change constantly and uncontrollably. A century in which cross-border job openings are important means of employment, a century where attitude is more important than subject-based excellence, a century where collaboration, innovation and creativity are irreducible demands by employers of labour, a century where adaptive skills are critical for entrepreneurship, creation of jobs and wealth.

All categories of teachers at all levels of education would find this resource book interesting and professionally helpful for their teaching practice. Because conditions of the modern world are in perpetual flux, teachers have to re-skill in order to produce adaptive graduates and the era of lecture method is literally over. It is these modern innovative instructional strategies that would enable teachers to produce such graduates who would survive and then succeed in the 21st century global economy.

This book would also be very useful to researchers and innovators in the envisioned pedagogic paradigm shift of this era. I therefore, proudly recommend this book, a compendium on innovative pedagogies to all classes of teachers and researchers on pedagogies and curriculum reforms in the modern era.

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DEDICATION

This book is dedicated to educators in the world

CHAPTER 1

EFFECTS OF CONSTRUCTIVISM BASED INSTRUCTIONAL METHOD ON STUDENTS' ACHIEVEMENT IN FINANCIAL ACCOUNTING IN SENIOR SECONDARY SCHOOLS IN ANAMBRA STATE

Chika M. Okonkwo

Abstract
The study was designed to investigate the effect of constructivism based instructional method on students' achievement in financial accounting in senior secondary schools in Onitsha education zone of Anambra State. The design of the study is quasi experimental research design. Specifically, non-equivalent pretest post-test control group design. Two research questions and two hypotheses were tested at 0.5 level of significance, guided the study. A total of 67 financial accounting students from two intact classes from the two co-educational schools in Onitsha South Local Government Area of Anambra State, served as sample for the study. One instrument, namely financial accounting achievement test (FAAT) was used for the study. Constructivism based instructional method and conventional method lesson plans were developed validated and used for the study. The financial accounting achievement test form 1 was used for pre-treatment assessment while financial accounting achievement test from II was for post-treatment FAAT yield reliability estimate of 0.77. Data collected were analyzed using mean score standard deviation and analysis of covariance revealing the following. Constructivism-based instructional method significantly improved students' achievement in financial accounting and gender as a factor has significant effect. It was recommended that teachers should be equipped with constructivism-based instructional method.

Keywords: Constructivism-based Instructional Method, Students' Achievement.

Introduction

Financial accounting is a vocational subject in Nigeria that teaches students how to manage financial transactions in a business setting. It plays a vital role in the Nigerian economy, and also a requirement for studying financial accounting related courses in higher education. Financial accounting provides the foundation for preparing future entrepreneurs and more essential for effective financial management and decision making within an organization. The objectives of financial accounting as contained in West African Senior school certificate syllabus (2011) was to lay a sound foundation for further study of accounting at higher level, it enables candidates to appreciate the rules and functions of accounting and assess candidates knowledge of basic accounting principles and their application to modern business activities. Despite the importance of financial accounting to the individual and national development, there is still evidence of low achievement in the subject by Nigerian students.

A number of factors have been identified to be contributory to students' poor academic achievement in financial accounting. Eze, Ezenwafor and Obidile (2016) argued that the poor academic performance of student in financial accounting has more to do with the teacher's method of teaching than the content of the curriculum of financial accounting. The main objective of teaching financial accounting is to equip students with professional skills. In order to achieve this, new strategies and innovations have to be introduced in the teaching of financial accounting subject. In view of these, there is need to use an innovative teaching method which is more activity-based, explanation, demonstration and collaborative techniques such as constructivism.

Constructivism is activity based, students-centered and interactive learning strategy. Student centered approached is a broad term that includes all innovative teaching methods that are usually activity oriented, where learners are expected to observe, analyze, synthesize and evaluate ideas or

phenomena using material or previous knowledge (Opara, 2011) Nworgu (2016) stated that constructivism is a kind of learning strategy that lays emphasis on active role of learners in the process of constructing their own knowledge. In constructivism, learners come into the classroom with new ideas concerning the new problems. And this lead learning to occur as a result of interaction between the new formation in the learning situation and the experiences gathered as a result of the interaction. Nworgu (2016) developed an instructional model based on constructivism adopted from Stofflet and Stoddart (1994), which is a five step instructional model comprising: Prior Knowledge, Exploration, Discussion, Dissatisfaction and Application (PEDDA). It is a problem solving oriented allowing students to explore and work in groups. Nwagbo and Aham (2015) defined constructivism as a teaching strategy which holds the view that knowledge are personally constructed and reconstructed by the learner based on his prior knowledge or experiences. It is a strategy that belief that knowledge is not a thing that can be simply given or transferred by the teacher in front of the classroom to learners seated at their desks.

With educational contexts there are philosophical meaning of constructivism as described by Piaget (1952) social constructivism, which argued that people produce knowledge and form meaning based upon their experiences. Nwagbo (2015) stated that learning starts when people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences. When we encounter something new, we have to reconcile it with our previous idea and experiences. To this we must ask questions explore and assess what the authors emphasized that students do not learn much by sitting in classroom listening to teachers, memorizing pre-packaged assignments and spitting out answers. Students must talk about what they are learning, relate it to their past experiences and apply it to their daily lives.

Constructivism-based practice require teachers to place students in more central position in the whole instructional programmed. This implies that students ideas should form a basis for discussion and investigation in the classroom. The constructivism teachers behave in an interactive manner, mediating the environment for the students and also seek the students' point of view in order to understand students' present conceptions for use in subsequent lesion (Glasserfield, 1995). This implies that learners should be given opportunity to discuss and clarify their experiences in order to encourage self-organization and reflective abstraction. This reflective abstraction is the driving force of learning. According to Yager (1991) there are five guiding principles of constructivist pedagogy namely:

- Posing relevant problem to students: Teachers need to make the concepts and phenomenon interesting and important to the student.
- Structuring learning around primary concepts: The constructivist teacher, when planning his/her lesson should organize information around conception cluster of problems, questions and discrepant situation. When learning activities are clustered around board concepts, students can select their own unique problem solving approaches and use them as spring board for the construction of new understanding.
- Seeking and valuing students' points of view: The teacher must encourage the students to think as clearly as they can about their ideals, by so doing will make school experience both contextual and meaningful.
- Adopting the curriculum to address students supposition: The adaptation of curricular task to address students supposition is a function of cognitive demands implicit in the specific task (the curriculum) and nature of questions posed by students engaged in the tasks (the supposition).
- Assessing student's learning in the content of teaching students conception rather than indicating "rightness or wrongness" should form the entry point for the teacher. This indicates the sort of intervention that would lead to learner's construction of new understanding and acquisition of new skills.

- Yusuf and Afokabi (2010) suggested that teachers should use methods and techniques which cater for multiple learning styles to help students achieving information and strengthen understanding. Iwuchukwu (20110 opined that the use of conventional approach in teaching subjects like financial accounting may not offer students high academic achievement. He is worried about this trend and its consequences on the achievement of students in financial accounting and call for a teaching method associated with higher students' academic achievement. Barth (2006) also supported the use of various innovative teaching methods by teachers, that will bring about knowledge acquisition, assimilation, achievement, recalling and application by students. Barth also stated that if teaching methods are correctly selected, it will develop logical thinking in students as well as their abilities for analysis, synthesis, induction and deduction. Different researches have been carried out on constructivism teaching approach, their result was that constructivism-based instructional method was more effective than conventional teaching method.

Statement of Problem

Poor academic achievement in vocational subjects especially in financial accounting at senior secondary school certificate examination by Nigerian students has been a cause of concern for financial accounting teachers and other stake-holder in education. This situation was been blamed on many factors especially the way financial accounting is being taught in schools. A lot of teaching methods including traditional method or conventional method, lecture method and so on, have been tried, but none has been able to make sufficient impact on students achievement in financial accounting. These problems motivated the researcher to work on the constructivism-based instructional method. The problem of this study put in question: would the use of constructivism-based instructional method in teaching financial accounting yield positive result in students academic achievement.

Purpose of the study

The purpose of this study was to examine the effect of constructivism-based instructional method on student's achievement in financial accounting. Specifically, this study determine:

1. The mean achievement scores of students taught financial accounting using constructivism-based instructional method (CBM) and those taught using conventional teaching model (CTM).
2. The mean achievement scores of male and female students' taught financial accounting using CBM and CTM.

Research Questions

The study was guided by the under listed research questions:

1. What are the mean achievement scores of students taught financial accounting using constructivism-based instructional method (CBM) and those taught using conventional teaching method (CTM)?
2. What are the mean achievement scores of male and female students taught financial accounting using CBM and CTM?

Hypotheses

The following null hypotheses were formulated and tested at 0.5 level of significance to guide the study:

$H0_1$: There is no significant difference in the mean achievement scores of students taught financial accounting using CBM and those taught using CTM.

HO_2: There is no significant difference in mean achievement scores of male and female students taught financial accounting using CBM.

Method

Research Design

The study employed quasi-experimental design specifically, the pre-test, post-test, non-equivalent control group was used. Quasi-experimental research design is considered appropriate for the study because intact classes were used to avoid disruption of normal class lessons. The study was carried out in public senior secondary schools in Onitsha South Local Government Area.

Population/Sample and Sampling Technique

Simple random sampling techniques balloting without replacement were used to select one local government out of four local government in the Onitsha education zone. Thus the local government selected was Onitsha South local government. 2 co-educational public secondary school out of 7 public secondary school were selected and used for the study. Purposive sampling were employed in school selection. The population of the study comprised of 137 SS1 financial accounting students (62 males and 75 females) in Onitsha South Local Government Area of Anambra State. The sample for this study consisted of 67 SS1 financial accounting students (33 males and 34 females), drawn from population. Intact class of the two schools were assigned purposely by the researcher for experimental treatment and control group respectively. All the students in each of the intact classes were used for the study. The experimental groups were taught the selected financial accounting concepts using constructivism based instructional method while the control groups were taught the same concepts using the conventional lecture method.

Instrument

The study was carried out using one instrument namely Financial Accounting Achievement Test (FAAT). FAAT was divided into two sections. Section A consist of personal data of respondent and section B consist of questions on achievement test from financial accounting text books based on the contents. FAAT consist of 50 multiple-choice items with options A-E. Each questions has only one correct answer from the options. One marks was allotted to each questions and total score were later converted into percentages. While each wrong answer attracts zero score.

Validation

The instrument FAAT with their answers as well as the title, the purpose, the research questions and hypotheses were given to three experts one from department of Education Foundation (Measurement Evaluation) Chukwuemeka Odumegwu Ojukwu University Anambra State, and two financial accounting teachers from secondary school that had taught and marked West African Examination for at least 5 years validated the instrument. This was done to ensure the items of the instrument were relevant to the content and match the level of student for the study. The content validation of FAAT was done using the table of specification. The number of items for each content area was based on that differential weightings and cognitive levels.

Trial Testing

The test items were first administered to 20 students of a co-educational school not included in the sample for the study. The reliability of the test, FAAT was established with scores obtained from trial testing which was administered to students using Kuder-Richandson 20(KR-20) which yielded reliability co-efficient of 0.77. This format was used because items were dichotomously scored such as right or wrong answer.

Experimental Procedure

The class teachers used for the study were secondary school financial accounting teachers with not less than five years teaching experience. The class teacher for the experimental group were briefed on how the study will go and how to apply the constructivism teaching method based on the step by step lesson plan prepared by the researcher. The class teacher for the control group were equally briefed and encouraged to use their conventional teaching method lesson plan for the study.

Experimental Group: The experimental groups were taught using the following step:

Step 1: The teacher interacted with the students to identify the student's prior knowledge of the topic.

Step 2: The students were divided into three groups and are given materials to explore and manipulate with guided instructions.

Step 3: The students gathered together and discussed their different ideas based on the materials given to them.

Step 4: The teacher discovered through discussion, questioning and answering techniques whether the students were still holding on the preconceived belief.

Step 5: The learner can now discussed the concepts, confidently and applied the knowledge outside the classroom settings.

The control group, the teacher taught them using their conventional teaching lesson plan.

The teaching lasted for two weeks of 40 minutes for both groups. Before the treatment commenced, first test were administered to them during resumption. The first administered test which was adopted as the school resumption test were scored and recorded. The recorded resumption test served as the pre-test scores. At the end of the two weeks, the items were reshuffled and re-administered to student as post-tested using the same instrument. The reshuffled re-administered test were scored and record. This became the post-test scores.

Results

Research Question 1: What is the mean achievement scores of students taught financial accounting using constructivism-based instructional method and those taught using conventional method.

Table 1: Mean Achievement and Standard **Deviation of students taught financial accounting using constructivism-based instructional method and those taught using conventional method**

Teaching approach	Pre-test			Post test			Mean gain score
	N	Mean	SD	N	Mean	SD	
CBM	35	40.14	4.103	35	45.23	2.723	5.09
CTM	32	38.50	4.487	32	41.59	4.087	3.09

The result in table 1 shows that the pretest and post-test mean achievement scores of students taught financial accounting using constructivism-based instructional was 40.14 and 45.23 respectively with standard deviation of 4.103 and 2.723 while mean gain score was 5.09 on the other hand, their counterpart taught financial accounting using conventional method had 38.50 with standard deviation 4.487 as their pretest and 41.59 with standard deviation 4.087 as posttest and 3.09 as mean gain score respectively. Both the mean of the pre-test and post-test of students taught financial accounting using constructivism-based instructional method were greater than that of student taught using conventional method. Thus signifies that CBM improves student's achievement in financial accounting.

Hypothesis 1: There is no significant different in the mean achievement scores between students taught financial accounting using CBM and those taught using CTM.

Table 2: Analysis of Covariance of students mean achievement scores in Financial Accounting

Sources of variation	Type of sum of square	Df	Mean square	F	Sig
Corrected model	362.306[a]	2	181.153	18.444	.000
Intercept	683.333	1	683.333	69.590	.000
Pretest	141450	1	141.450	14.405	.000
Group	151.815	1	151.815	15.461	.000
Error	628.440	64	9.819		
Total	127728.000	67			
Corrected Total	990.746	66			

a. R squared = .366 (Adjusted R squared = .346)

Table 2 showed that there is a statistically significant different in mean achievement scores of students taught financial accounting using constructivism-based instructional method and those taught with conventional instructional method, F = 15.46. The obtained p-value (.000) is less than the stipulated level of significance (.05). The null hypothesis of no significant between the two groups was therefore rejected. . Hence there is difference between the mean achievement scores of students taught financial accounting with CBM and those taught with CTM.

Researcher Question 2: What is the mean achievement scores of male and female students taught financial accounting using CBM and those taught using CTM?

Table 3: Mean Achievement and standard deviation scores of male and female students taught financial accounting using constructivism-based instructional method and conventional method

Gender	Pretest			Post-test			Mean Gain score
	N	Mean	SD	N	Mean	SD	
Male	33	40.03	3.861	33	44.91	2.941	4.88
Female	34	38.71	4.720	34	42.12	4.205	3.41

In table 3 above, the pre-test and post-test mean achievement scores of male and female taught financial accounting with constructivism based method are male 40.03, 44.91 and standard deviation 3.861, 2.941 and female 38.71, 42.12 with standard deviation 4.720, 4.205 respectively. The male students had mean gain score of 4.88 while female counterpart had 3.41. The result showed a remarkable difference in the mean gain score of male and female students taught financial accounting using CBM with male students having higher mean gain score.

Table 4: Analysis of Covariance of male and female students' mean achievement scores in financial accounting

Sources of variation	Type of sum of square	Df	Mean square	F	Sig
Corrected model	297.021[a]	2	148.511	13.701	.000
Intercept	646.545	1	646.545	59.647	.000
Pretest	166.532	1	166.532	15.363	.000
Gender	86.530	1	86.530	7.983	.006
Error	693.725	64	10.839		
Total	127728.000	67			
Corrected total	990.746	66			

a.R squared = .300 (Adjusted R squared .278)

Table 4 shows that there is a statistically significant difference in mean achievement scores of male and female secondary school students taught financial accounting using constructivism-based instructional model and those taught with conventional instructional method.

F = 7.98 the obtained p-value (.006) is less than the stipulated level of significance (0.05). The null hypothesis of no significant between the two groups was therefore rejected. Hence there is a significance difference in the mean achievement score of male and female students in financial accounting.

Discussion

The result showed that experimental groups had a higher mean than control group. The use of constructivism-based instructional method facilitates the learning of financial accounting. The constructivism-based provides opportunity for students to take active role in building their own knowledge. The results are consistent with the finding of Ekon & Edem (2015) that showed significant difference in achievement between experimental and control group when exposed to constructivism based method.

The result also showed that male had a higher mean than females. Thus, implies that the constructivism-based method favoured the males than females. The implication of the result of this study is that if an appropriate method is adopted in the teaching of financial accounting, the male

students have the chance of performing better than their female counterpart. The different in intellectual ability between male and female students can probably be attributed to factors like attitude interest, efficacy of the research method used. Thus, any good teaching strategy/method like constructivism-based instructional method will improve the academic achievement of male and female student.

Conclusion

From the findings constructivism-based method has proved to be effective in increasing financial accounting students 'academic achievement and bring out the best in financial accounting student as well as improving student learning concepts. This is because it aimed at developing the learner by imparting them with skills on to learn a specific subject and schemata required to measure up to the specific performance. The use of constructivism-based instructional method could improve the male student's achievement in financial accounting. This is evidence by the fact that the male students achieved significantly higher than the female students.

Recommendations

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

1. Financial accounting teachers are encouraged to use constructivism-based instructional method because it has been found to construct students' knowledge positively, allowed active participation and social interaction in the classroom with peers and facilitators.
2. Teachers are advised to apply constructivism-based instructional method when teaching abstract or difficult concepts because it will help students to construct their knowledge independently.
3. Federal and state ministries of education should organize seminars/workshops and conferences on the importance of innovative strategies as aids to teaching and learning.

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