

**THE EFFICACY OF STUDY TECHNOLOGY AS AN INNOVATIVE
INSTRUCTIONAL METHOD ON THE LEARNING OUTCOMES OF
UNDERGRADUATES IN A NIGERIAN UNIVERSITY**

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ABSTRACT

In most Nigerian universities, the lecture method accompanied by elements of explanation is essentially the method of instruction. The recent general observation about the undergraduates' functionality after graduation has led to the query about the teaching methodologies effectiveness in the graduates' preparation. The purpose of this study is to find out the efficacy of Study Technology, an innovative instructional method, on the learning outcomes of undergraduates in a Nigerian university. This study is both comparative and descriptive in design. The population of the undergraduates' involved is 2,000 from where a sample of 413 was exposed to Study Technology as a means of instruction. The sampled students were exposed to both qualitative and quantitative courses using Study Technology method. The same lecturer had taught the same qualitative and quantitative courses with the same course outlines, at the same lecture time-table hours, under the same conditions but using different teaching methods which were the lecture method and the Study Technology within two consecutive sessions. The data collected from the score sheets of both groups were analyzed using descriptive statistical techniques such as percentages, measures of central tendency and dispersion and t-test. Frequency curves were drawn to show trends of performances of both groups. Two research questions and two hypotheses were raised to investigate the study. The results revealed that when Study Technology was used, performances improved with increases in all measures of central tendency, the scores were more widely distributed, the trend of performances tended towards a negatively skewed distribution, and the two hypotheses raised were accepted in favor of a significant difference in academic performance of university undergraduates in both courses. The result of this study emphasized the need to introduce a more innovative, participatory and intensive method of instruction at the university level in a bid to achieve the expectation of the Nation Policy on Education for the country.

Key words: efficacy, Study Technology, innovative instructional method, learning outcomes, undergraduates.

Introduction and Background to the Study

In the entire world, there is a shift from the traditional and conservative styles and methods to new innovative strategies in tackling modern day challenges. The education sector and most especially the university system cannot be left behind in this change revolution. From observation, in the university system in Nigeria, information and knowledge dissemination within the lecture rooms are carried out essentially through the use of lecture method. This is sometimes corroborated with a little discussion and question and answer methods. The attendant consequence of this traditional method of teaching is learning by rote with the primary intention to only pass examination and obtain the required degree certificate. Studies have shown however, that lecturers who engage in the use of these traditional methods do so out of inexperience (Fagbulu, 1972). The university system also has as part of its powers of autonomy as conferred by the National Policy on Education (2004) to recruit its academic staff without recourse to the possession of a professional teaching qualification. This factor might have increased lack of experience in teaching methods appropriate to promote improved learning outcomes among the undergraduates. The lecture method though have its own advantages (Olowoye, 2001), the disadvantages necessitated the need to look for alternative ways of graduates' preparation (Olowoye and Adenaike, 2009). Ajayi and Ogunyemi(1990) and Hershberg(1996) have canvassed for a major pedagogical reform and systems approach to teaching and learning.

In the 21st century, a lot of technological developments have come to the fore. Organizations in the developed climes, most especially educational institutions which engage in information and knowledge dissemination have continued to bring into the classroom the innovative ideas and devices into teaching. These tools of innovation in Information and Communication Technology (ICT) which is at the beck and call of students need to be optimally utilized to bring some innovation into how students are instructed within the four walls of the university system in the developing countries.

The university undergraduates are expected to be matured students in their formal stage of learning (Osokoya, 2011) and should be able to undertake individual study programs with minimum supervision from their teachers. Some methods that matured students can be engaged in during teaching and learning as enumerated by Awoniyi (1979), Odumosu (1999) and Olowoye (2001) include the Dalton Plan, question and answer, project, discussion, tutorial, demonstration and problem solving. Some other teaching methods for matured students include field trips, peer teaching, team-teaching, micro-teaching and programmed instruction. Study Technology is a new and modern strategy, as well as a more intensive and innovative teaching method that looks at learning from the learner's perspective.

The word technology was coined from a Latin word '*techne*' which means 'to weave together'. Study Technology therefore involves weaving together a combination of media resources to aid learning and achieve instructional objective. This activity of technology, according to Yan (2010) leads to continuous innovation and product development. The

resources that Study Technology weaves together to produce this innovative and product of learning include textbooks, audio, video, multi-media, real objects models, simulations, demonstrations etc. According to Applied Scholastics International (2007), Study Technology consists of tools and techniques teachers can use to improve learning rates of their students. It can also be used to promote understanding of theories, concepts and ideas. Study Technology assist the student to use the materials read and apply the content in future in their work and life. Some of the elements of Study Technology include qualified and experienced staff, defined curriculum, provision of minimum textbooks, access to general reading materials, assignments which should be completed by the student within a reasonable time limit, consultation with instructors, a record of progress in assignment, a prepared test, social pressure of other students and team work. These elements have been found to have effects on academic achievements of students (Awoniyi, 1979; Ajayi and Ogunyemi, 1990).

Statement of the problem

The performance of university undergraduates has been a source of concern in recent times. The performance of a student in a course can be attributed to a number of factors such as interest in a course to which he/she has been admitted (Hubbard, 2004), school variables, personality factors and socio-economic factors (Ajayi and Ogunyemi, 1990). Since it is impossible to offer what one does not have, the undergraduate non-functionality may be traced to lack of adequate content or inadequate preparation during training. This may be suggestive of a poor teaching or training system. Consequently, method of teaching can also be a factor contributing to poor academic performance. The assertions made by Applied Scholastics International (2004) on the influence of Study Technology on the learning outcomes of students and notable individuals in West African countries and other parts of the world makes it expedient to ascertain its impact on the performance of undergraduates in Nigeria. To this end, this study intends to find out if Study Technology will be an effective innovative method that will produce an improved learning outcome among the university undergraduates in Nigeria.

Purpose of the study

The purpose of this study is to find out if claims of positive impact of Study Technology as an innovative teaching and learning method will produce and improve learning outcomes among the undergraduates in Nigeria. These university undergraduates had been previously customized to lecture method.

Research questions and Hypotheses

The sample used for this study had been customized to the use of lecture method throughout their undergraduate studies at the lower levels of 100 and 200 levels. Other courses offered at the 300 level when this study was conducted also utilized essentially lecture method. The use of Study Technology as an innovative instructional method is a total deviation from these antecedents. The efficacy of Study Technology as an innovative instructional method need to be verified to sufficiently have evidence of its impact on improved performance when used among undergraduates. Therefore the primary research question for this study is: What is the

efficacy of Study Technology as an innovative instructional method on the learning outcomes of Nigerian undergraduates? Based on this primary research question, this study intends to provide answers to the following investigative questions to determine the efficacy of Study Technology method among the university undergraduates.

Research questions

1. Were there improvements in the trends of academic performances of university undergraduates when Study Technology was used in place of lecture method to teach a **qualitative** course of study?
2. Were there improvements in the trends of academic performances of university undergraduates when Study Technology was used in place of lecture method to teach a **quantitative** course of study?

Research hypotheses

The following are the hypotheses raised for this study:

H₀ (null hypothesis)

There is no significant difference between the academic performances of university undergraduates from Study Technology method when compared with lecture method performances in a **qualitative** course of study.

H₀ (null hypothesis)

There is no significant difference between the academic performances of university undergraduates from Study Technology method when compared with lecture method performances in a **quantitative** course of study.

Research methodology

This research is both comparative and descriptive in design. A new method of teaching and learning, the Study Technology, was introduced to teach a sample of university undergraduates who had been exposed excessively to lecture method. A study on university undergraduates' perception of this new innovative teaching method was reported in a research conducted by Adenaike, Oluwole and Olowoye (2015). The claim of Study Technology's impact on the lives of those who had been exposed to it in other nations of the world needed verification here in Nigeria. To this end, the examination results of students who were mainly taught using Study Technology had to be compared with the results of another sample of students who offered the same course, taught by the same lecturer, under the same conditions and at the same lecture hours the preceding year. The examination results were collected from the course lecturer and compared in this study. The results were analyzed using descriptive statistical techniques. Frequency tables were drawn, percentages of performances were calculated, measures of central tendency and dispersion were found to answer the research questions and t-tests were conducted to test the two hypotheses raised. A sample of 413 students from a population of 2000 College of Applied Education and

Vocational Technology students at the 300 level in a pioneer University of Education in Nigeria was used for this study.

Data Presentation

Table 1: Performances of students in **Qualitative** course of study for Lecture (2004/2005) and Study Technology (2006/2007) methods.

Scores obtained	2004/2005		2006/2007 session	
	Number of Students		Number of Students	
	(f)	f ^l	f	f ^l
5-9	0	0	0	3.6
10-14	0	8.7	11	7.3
15-19	26	30.3	11	11.6
20-24	65	54	13	15.6
25-29	71	79.7	23	19.3
30-34	103	86.7	22	19.6
35-39	86	88	14	44.3
40-44	75	81	97	55.3
45-49	82	71	55	69.3
50-54	56	61.3	56	56.3
55-59	46	45.3	58	55.3
60-64	34	33	52	52.6
65-69	19	19	48	46
70-74	4	9.3	38	32.6
75-79	5	3	12	20.3
80-84	0	1.6	11	8.3
85-89	0	0	2	4.3
90-94	0	0	0	0.6
Σf	672		523	
Mean	37.97		48.63	
Median	38.63		50.88	
Mode	32.75		42.82	
s	13.43		15.85	
Trend	mn<mdn>md		mn<mdn>md	
Trend Decision	Positively Skewed		Positively Skewed	
S ²	180.2		251.22	
df	1193			
ac	0.05			
t-table	1.96			
t-cal	13.49			
test-decision	Significant			

Table 2: Performances of students in **Quantitative** course of study for Lecture (2004/2005) and Study Technology (2006/2007) methods

Scores obtained	Total number of students			
	2004/2005		2006/2007	
	f	f ^l	f	f ^l
0-4	0	0	0	0.6
5-9	0	0.3	2	1
10-14	1	0.6	1	2
15-19	1	2	3	3.3
20-24	4	8.6	6	3.6
25-29	21	15.6	2	4.6
30-34	22	14.3	6	5
35-39	0	56	7	21.3
40-44	146	75.3	51	31.6
45-49	80	124.6	37	46.6
50-54	148	111	52	47.6
55-59	105	127.6	54	58
60-64	130	98	68	57.6
65-69	59	76	51	55
70-74	39	36.3	46	40.3
75-79	11	17.6	24	24.3
80-84	3	4.6	3	9
85-89	0	1	0	1
Σf		770		413
Mean	53.08		56.69	
Median	53.21		58.16	
Mode	52.56		61.76	
s	11.3		13.25	
Trend	Mn<mdn>md		Mn<mdn>md	
Trend decision	Tend to Positively Skewed		Negatively Skewed	
S ²	127.69		175.56	
df	1181			
Ac	0.05			
t-table	1.96			
t-cal.	5.47			
decision	Significant			

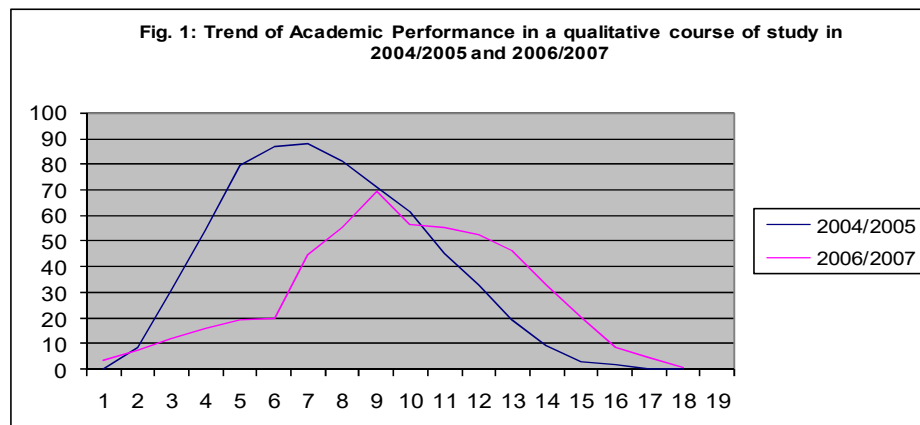
Table 3: Performances of students in **Qualitative** course of study in Lecture (2004/2005) and Study Technology (2006/2007) methods showing grade points and

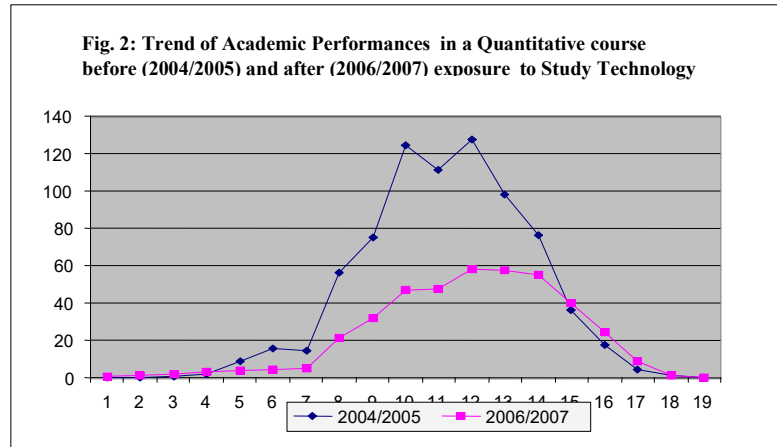
percentages

Scores	Grade Point	2004/2005 Total		2006/2007 Total	
		(f)	%	(f)	%
30-39	0	351	52.2	94	18.0
40-44	1	75	11.2	97	18.5
45-49	2	82	12.2	55	10.5
50-59	3	102	15.2	114	21.8
60-69	4	53	7.9	100	19.1
70-100	5	9	1.3	63	12.0
	Total	672	100	523	100

Table 4: Performances of students in **Quantitative** course of study in Lecture (2004/2005) and Study Technology (2006/2007) methods showing grade points and percentages

Scores	Grade Point	2004/2005 Total		2006/2007 Total	
		(f)	%	(f)	%
30-39	0	49	6.4	27	6.5
40-44	1	146	19.0	51	12.3
45-49	2	80	10.4	37	9.0
50-59	3	253	32.9	106	25.7
60-69	4	189	24.5	119	28.8
70-100	5	53	6.9	73	17.7
	Total	770	100	413	100





Data Analysis

Research question 1:

Were there improvements in the trends of academic performances of university undergraduates when Study Technology was used in place of lecture method to teach a **qualitative** course of study?

From Table 1, when lecture method was used in teaching a qualitative course in 2004/2005 session, the performance of the undergraduates showed very low measures of central tendency. The trend was positively skewed meaning that the general performance was with low marks as in Figure 1. However, with the sample that was taught with Study Technology method in 2006/2007 session, all the indices of measures of central tendency improved significantly. The standard deviation of the 2004/2005 session sample (s, 13.43) was less than the standard deviation value for 2006/2007 session (s, 15.85). This implied that the scores of 20104/2005 session were closely packed together while the 2006/2007 sample was widely distributed. This claim is supported in Table 3 where the performances were more widely distributed among the grade points of the sample taught with Study Technology method. This trend is indicative that Study Technology method catered for variation of students' abilities in a mixed heterogeneous group that is typical of a Nigerian undergraduate class.

Research question 2:

Were there improvements in the trends of academic performances of university undergraduates when Study Technology was used in place of lecture method to teach a **quantitative** course of study?

The use of lecture method to teach the undergraduates the quantitative course in 2004/2005 session produced a very close multimodal but positively skewed distribution with all the measures of central tendency as shown in Table 2. In 2006/2007 session when Study Technology was used in teaching the quantitative course, the performance improved significantly with increases in all measures of central tendency and showed a negatively skewed distribution as shown in Figure 2. In comparing the standard deviation of the two samples, the result of 2004/2005 standard deviation (s, 11.3) was lower than the 2006/2007

sample standard deviation (s, 13.25). The implication of this is that the scores of the 2006/2007 sample were more widely distributed to cater for all categories of undergraduates' abilities and performances. Study Technology method thus possesses more discriminatory potential in sorting between poor and brilliant students. Table 4 also showed that Study Technology in 2006/2007 session produced impressive distinction class than the lecture method used in 2004/2005 session. The distribution of scores among the grade points in 2006/2007 session were more distributed than the skewed distribution of 2004/2005 session's performance.

Hypotheses testing

Hypothesis 1

H₀ (Null hypothesis)

There is no significant difference between the academic performances of university undergraduates from Study Technology method when compared with lecture method performances in a **qualitative** course of study.

In testing the hypothesis above, the t-test conducted as shown on Table 1 had t-test calculated as 13.49 which is greater than the t-table of 1.96. Therefore the null hypothesis is rejected. This implies that study technology produced a significant difference in the performance of the undergraduates in the qualitative course of study when compared with the performances obtained when lecture method was used.

Hypothesis 2

H₀ (Null hypothesis)

There is no significant difference between the academic performances of university undergraduates from Study Technology method when compared with lecture method performances in a **quantitative** course of study.

In testing the above hypothesis, t-test conducted as shown in Table 2 showed t-calculated to be 5.47 as compared with t-table of 1.96. The above null hypothesis is therefore rejected. This also implies that study technology method produced a significant difference in the academic performance of university undergraduate in the quantitative course of study.

However, if the impact of Study Technology is compared on the qualitative and quantitative course of study's performance, it would appear that the Study Technology method produced a more significant learning outcome in the quantitative than the qualitative course of study.

Discussion of Results

The above results showed that Study Technology has the ability to improve on learning outcome when used exactly as designed (Slaughter, 2004). The reason for this as propounded by Applied Scholastics International (2007) is that Study Technology helped students to truly understand what they study and teach them essentially how to learn. As reported in Adenaike, Oluwole and Olowoye (2015), the student sampled reported that the way Study Technology is designed, its operation in the course room helped them to know how examination questions are likely to be framed and thus help them to prepare towards that end. The report, Adenaike, Oluwole, and Olowoye (2015), also mentioned that undergraduates liked Study Technology because it promoted in them a serious engagement in academic work. An improved learning

outcome in both qualitative and quantitative courses, as sampled in this study, is therefore an affirmation of the efficacy of Study Technology method in the learning outcomes of the university undergraduates.

The undergraduates also mentioned as one of the prospects of the use of Study Technology in Adenaike, Oluwole and Olowoye (2015), as its ability to elevate study habit, independent research culture, investigative mindset, and allowing for serious engagement in academic work. The university being the pinnacle of human development training need to inculcate the use of innovative method of instruction like the Study Technology method to fulfil the expectation of the National Policy on Education (2004) in the production of functional graduate who has improved learning outcomes in their academic career.

The wider spread of scores, reduction of failure rates and improved distinction rates corroborates Cruise (2007) and Applied Scholastics International (2004) assertion that study technology has the ability to take care and cater for all categories of learners.

Recommendations

From the report of this study, the following recommendations are hereby put forward:

1. Since this study has established the efficacy of Study Technology as an innovative instructional method in producing significantly improved learning outcome among the university undergraduates, the lecture method which is currently the predominantly used method should be substituted with this innovative method in all courses of study.
2. The university lecturers should be trained in the use of Study Technology method of instruction to build their capacity to use it exactly as designed. While Study Technology method will demand for more effort at the discharge of the academic knowledge transfer and supervision in the lecture room/course room, the resultant improved learning outcomes of the undergraduates will be satisfying to the committed academic.
3. The university students should be trained and made to conform to the demands of Study Technology method even though it is more inclusive, participatory, rigorous, intensive and intellectually challenging.
4. To achieve the improved learning outcomes Study Technology method offers, team teaching, where more than one lecturer handles a course room at any given period should be the norm in the university system. It will help in satisfying the demand of Study Technology and reaping the expected benefit of its usage.
5. The university lecturers should be ready to assume the status of an instructor when Study Technology is utilized in the course room in order to achieve improved learning outcomes among the university undergraduates.

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