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Comparative Study Of The Effect Of Study Technology Mode Of Instruction And Lecture Method On The Academic Performance Of University Students In Nigeria: Implication For Academic Staff Capacity Development.

Samuel Oladipo

Biyi Olowoye

A. Adenaike

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Introduction

The University system is the pinnacle of manpower training and development in Nigeria. Since 1948 when the first University was established at Ibadan, the Nation has witnessed the establishment of more universities which are owned by governments, corporate organizations, and private individuals. The great expectation is that the graduates of these universities will have tremendous impact on the Nation after their graduation as stated in the goals of tertiary education in Nigeria (National Policy on Education, 1998). This expected result has been on the decline since the middle 1980s due to a number of factors which, according to Ajayi and Ogunyemi (1990), include school variables (resource inputs, class size, location.); personality factors (genotype, phenotype, intelligence.), socio-economic variables and so on. According to Uwatt (1988) and Awoniyi (1979) the most prevalent method of instructional delivery in the University system is the lecture method. Other methods such as experimental, project, tutorial and discussion are sometimes employed by the university lecturers depending on the course of study and issues under consideration. The goal of every instruction is that learning should take place. If this expectation is not being met as perceived in the quality of university graduates, there may be the need to have a second look at the instructional mode being utilized. The unemployables of many Nigerian graduates always require that a retraining program be organized to make them perform in any employment after graduation. This phenomenon has necessitated this study, that is, to investigate whether an alternative instructional or teaching program will produce a better result in students' performance and subsequently in their productivity after graduation.

Statement of the Problem

The lecture method is probably the most prevalent and only method some university lecturers often employ in the training programs leading to the preparation of Nigerian graduates. In recent times the quality of graduates in Nigeria has necessitated a second look at this predominant method of preparation. Since the lecture method is predominantly teacher – centered and mostly leaves the learners as passive participants, only to take notes and probably ask questions after the lecture delivery if and when time permits, the need has arisen to look for alternative ways of graduates' preparation that will be all inclusive. There is a need for a method that will shift the attention to the learners, while the lecturers play the role of facilitator of learning. One of the methods that can promote these all inclusiveness is Study Technology. It is to this end that this study envisages answering the question: "what will be the effect of study technology mode of instruction and lecture method on the academic performance of university students in Nigeria?

Rationale and Purpose of the Study

The Education Trust Fund (ETF) organized an intensive training workshop for a sample of University and College of Education Teachers in Nigeria on Study Technology in 2006. The graduands of the program were certified as Master Trainers in Study Technology and were required to teach this new

technology to both teachers and students of Education in the tertiary education system in Nigeria. Prior to this training, the researchers have been using other methods but predominantly lecture method to teach in the University system.

After the completion of the training on Study Technology the researchers embarked on the implementation of Study Technology method to prepare students in a course of instruction to check the veracity of the claims of the usefulness of the new method on students' performance. It is to this end that this study intends to find out:

1. The performance of university students when lecture method was used in their preparation for a particular course of study.

2. The performance of university students when study technology was used in their preparation for the same course that employed lecture method as an instructional mode.

3. If there is any significant effect on the performance of the university students when study technology was employed as a technique for their preparation?

Research Questions

This study intends to answer the following questions:

1. What was the trend of the university students' academic performance when lecture method was used in their preparation?

2. What was the trend of the university students' academic performance when study technology was used in their preparation?

3. Is there any significant difference in the trend of academic performance of university students when study technology was used as against the use of lecture method?

Research Hypothesis

The hypothesis raised for this study is:

There is a significant difference in the academic performance of university students in a course of study when study technology mode was used in the place of lecture method.

Scope

This study being an explorative and quasi-experimental study is limited to cover students of the Educational Management department in a University of Education in Nigeria.

The Significance of the Study

This study will open up a new methodology to both the university lecturers and students. The requirements of the Study technology method entail the full involvement of both the instructor and the learners. This study will help increase the capacity of the lecturers in taking interest in their learners and also assist the learners in improving their capacity to study and look for information on their own. If this

study reveals that the performance of students are positively influenced by exposing them to this new method of inquiry, the university may see the need to train its academic staff on the full use of this method. Exposing the students to this method may also increase the capacity of students to work cooperatively with others, learn how to take instructions and develop independent capacity for studying and investigation. This will ultimately improve their functionality and quality of service rendered after graduation. The implementation of this new technology will assist the University in providing quality education and highly functional graduates. This will make the University become highly preferred by its publics.

Teaching Methods and Study Technology

According to Awoniyi (1979) the lecture method is one of the more suitable teaching methods for educated students, like those in the universities. However, the choice of a teaching method may depend on the nature of the subject or course and the experience of the teacher. Awoniyi (1979), Odumosu (1999), Olowoye (2001) explained other methods used in teaching students at various levels of education. These include question and answer, project, textbook teaching, discussion, tutorial, audio-tutorial, demonstration, and problem solving methods. While some methods such as play-way, story, contest, activity method may be suitable for younger students, matured student are often exposed to more mentally challenging methods such as seminar, field trip, peer teaching, programmed instructions, team-teaching, and micro-teaching. The Dalton plan, according to Awoniyi (1979) is another teaching method which is more challenging and demands a high degree of responsibility useful for the older and more educated student. Generally speaking, a single lesson always witnesses a mixture of many of the methods mentioned above; however, in every lesson a particular method may be dominant depending on the teachers training, experience and the nature of students in the course room. The university system is assumed to harbor in its domain matured, responsible students who have reached the formal stage of human development. Consequently methods such as lecture methods are predominantly used during teaching sessions as pointed out by Awoniyi (1979) and Uwatt (1988). Lecture method lends itself for use to this group of students because of its inherent advantages. These include the coverage of large amount of content within a short time; coverage of a large audience or class size and it discourages interruptions.

The university system is empowered with academic freedom which covers the appointment of staff (NPE, 1998). For this reason the university recruits their academic staffs that are deemed very competent in their area of specialization sometimes without any pedagogical experience. The most easily available method of instruction for this class of academic staff is the lecture method which they have been exposed to during their tutorage as undergraduates. However, the lecture method is fret with flaws. These include, as highlighted by Awoniyi (1979), Odumosu (1999) and Olowoye (2001), turning the students to passive listeners and only to take notes. It also leads to boredom as the lecture progresses. It is not suitable for attaining high cognitive goals, science courses, manipulative skills, and it assumes that all learners have the same characteristics or are of a homogeneous group.

Fagbulu (1972) is of the opinion that teachers who depend solely on the lecture method are inexperienced. Fagbulu (1972) is of the opinion that the classroom teaching process should follow a crude formula of the teacher not speaking for more than a quarter of teaching period, another quarter for written work and the rest time shared between various techniques such as using visual aids, answering questions of a deductive nature, dramatizing etc. From the foregoing, the utilization of

lecture method can not be an efficient and effective means of producing high caliber manpower for an emerging economy.

Ajayi and Ogunyemi (1990) observed that many Nigerian educationists such as Fafunwa, Adesina and Aghenta opined that the country's education system has not been productive over the years. Hence there have been calls for systems approach which would promote "resource-based learning" or what was termed as "individualization of instruction" which would make a student not only to "teach" him or herself, but would also be a "tutor" and at the same time a "tutee" of other students.

Medahunsi (1985) also concluded in his study that most undergraduates in Nigerian universities lack effective study techniques and that the universities lack adequate teaching facilities coupled with shortage of library materials and equipment.

In response to the inadequacy of training given to school graduates, Louis V. Gerstner Jnr., IBM's CEO and host of the National Education summit, in Hershberg (1996), lamented "We (business) can teach (students) how to be marketing people. We can teach them how to manage balance sheets. What is killing us is having to teach them to read, and to compute and to communicate and to think".

Hershberg (1996) noted that there is a need for a school system to produce graduates who are flexible, adaptable, quick learners and problem solvers. To achieve this Hershberg (1996) called for education standard movement that will involve major pedagogical reform.

Study Technology which is heuristic in approach, is a teaching method that has been devised to fill this gap. Applied Scholastic International (2007) explained Study Technology

"as a learning system that produces a greatly improved result when used exactly. L. Ron. Hubbard developed Study Technology to help students truly understand what they study and essentially how to learn. It consists of tools and techniques teachers can use to improve learning rates of their students. It can be used to improve students' ability to understand and use the materials they read and study. Study Technology is not a collection of study tips or memory tricks, but rather a system of learning how to learn. The use of Study Technology brings about an understanding that results in the ability to apply what one learns at school in one's work and in life".

According to Applied Scholastics (2007) "passing a test is important, but when it comes down to whether or not the child will remember and apply what he has learned after the test is over, there is no other solution than Study Technology". Slaughter (2007), the CEO of Applied Scholastics stated, "it is not that educators are unwilling or unable to teach, it is a matter of a missing link between their teaching and the comprehension of their students. And it is not that students are unwilling or unable to learn. It is a matter of the gap in their education – the subject of the study itself, their very ability to learn". The remedy of this crucial gap in learning is what Study Technology provides. Jatta (2007), a Secretary of State of Education in the Gambia where over 6,000 Gambian school teachers have participated in Applied Scholastic four-week national training program on Study Technology emphasized that:

"for most people, teaching is not an attractive field. In particular, where you have large class sizes of 40,45 and up to 50, and are dealing also with some characteristics of indifferent students, if you have a technique in reaching each student and helping the student discover what the difficulties are, half of the work is done, and the teacher and the student both enjoy it. I feel the technology is a godsend for

teachers and students alike".

Study Technology has had great impact on individual lives as exemplified in the life of the famous actor Tom Cruise who had initially been diagnosed and labeled as dyslexic but later turned out to be both licensed pilot and highly trained aerobatic pilot, film producer and owner-operator of three (3) companies upon been exposed to Study Technology. In Cruise (2007) own words, "Study Technology works. It can turn around anyone's education difficulties and change one's life. It is applicable to people at every level of society, every nationality, every age".

Some of the elements of Study Technology have been reported to have positive effects on academic achievements of students. These include qualified and experienced staff, provision of minimum textbooks, access to general reading materials, promoting the use of home work as teaching method and social pressure by other participants in the school setting (Ajayi and Ogunyemi, 1990). Other elements present in the use of Study Technology can also be found in the Dalton Plan (Awoniyi, 1979). These include setting a defined curriculum, assignments which should be completed by the student within a reasonable time, provision of all materials, consultation with trained instructors, a record of progress in assignment and a prepared test. In Study Technology, team work as a suggested pedagogical reform by Hershberg (1996) is a major tool. Team work becomes far more important than isolated individual effort both because it is a skill greatly needed in the work place and because it is okay to learn together when everyone knows in advance what problem solving skills must be mastered to meet the standards (Hershberg, 1996). Furthermore the components of Study Technology encompass the elements of individualized instruction, programmed instruction, peer teaching and team teaching. According to Applied Scholastic (2007), "Technology" means "methods" of application to obtain a specific result. Study Technology is a conglomeration of diverse methods to achieve understanding and application of what is learned.

Research Methodology

This research is explorative, descriptive and quasi-experimental in design. Study technology was introduced to teachers in the tertiary teacher education institutions in Nigeria in 2006. This study is most probably the first of its kind on Study Technology in Nigeria. The performance of the students will be used to describe the effect of the method on their preparation and advice the University on the way forward.

Population and Sample for the Study

The population of the study comprises all the Educational Management Students in the College of Applied Education and Vocational Technology of the University of Education numbering 2,000 (two thousand students). A sample of 300 level students was selected for this study. The total number of students for the control group was 677 (six hundred and seventy-seven) while the experimental group was 499 (four hundred and ninety-nine). The control group consists of students who took a course in school public relations which was more qualitative in nature in 2004/2005 session while the experimental group took the same course of study in 2006/2007, the following session.

Research Instruments

In response to the requirements of Study Technology as a method of instruction the research instrument

used include a course text, check sheets – containing series of programmed instructions for each course hour in the course room, exercise books for noting students' responses, course test items and the examination results of the control and experimental groups. The researchers observed the students during this investigation to identify and remove barriers to learning as the course room activity progressed.

Procedure for Data Collection

At the commencement of the study for the experimental group, the Study Technology method was explained to the group to remove grey areas in its implementation. The students were requested to obtain the course text voluntarily in the available bookshops. A check sheet containing series of instructions in the form "READ" and "DRILL" was administered at the beginning of each topic to be treated in the course room. The students were asked to work in pairs through the check sheet and to countersign by appending their signatures and dates on the check sheets of their partners as they complete each instruction. The researchers go round to supervise the work of the students in the course room by marking correctly the responses of the students as required by the check sheet. The researchers, now serving as the instructors, also went round to attend to requisitions of students as the study progressed. The instructors refrain from giving answers to the requirements of the check sheet but directed the students to where such remedies could be supplied to their inquiry. At the end of each course hour, the check sheets were collected and countersigned with dates by the instructors/researchers. The check sheets now serve as attendance records for each student. The notes where responses were noted were collected weekly for assessment by the researchers/instructors and returned before the commencement of the next course hour.

The progress on the check sheets were used to arrange the course room the next course hour so that students within the range of the same items could pair up and work together to finish the assignment in the course room. Students with incorrect responses were directed to the actual pages to look for the correct responses to the appropriate items. Students who completed a topic under consideration were given new check sheet for the next new topic in the course room. This procedure continued until the conclusion of the course work after which a set of questions were administered as examination for the course. The results of the examination were used in analyzing the performance of students under the program. In the course of answering the questions posed by the drills on the check sheet, the twins (that is, the study partners) were to assist each other in finding the correct answers through discussion among each other. Students were instructed only to interact with their twins in the course room. Any need for further clarification was directed to the instructor.

Data Analysis

The data collected from the score sheets of both the control and experimental groups have been analyzed using descriptive statistical techniques. Statistical tools used to analyze the frequency tables constructed include measures of central tendency and t-test was used in handling the hypothesis stated in the study.

Percentages were used to describe the performances of both groups. Frequency curves were drawn to show the trend of performances of both groups. The frequency tables drawn have class intervals synchronized with the grade point classification used by the university system.

Presentation of Data

The data collected from the raw score sheets of students in the Educational Management Department who sat for the course where study Technology tools were used as experimental and control groups are presented in Tables 1, 2, 3 and 4. The control group data were obtained from exam results of 2004/2005 session, while the data from 2006/2007 represented scores from the experimental group. The research questions were examined using the processed data from Tables mentioned above.

Research Question 1:

What was the trend of university students' academic performance when Lecture method was used in their preparation?

The indices from the measures of central tendency for the session 2004/2005 when lecture method was used as shown on Table 2 reveals the relationship: Mean < Median > mode which tends towards a positively skewed distribution. In drawing the frequency curve for the performance as shown in Figure 1, a slightly positively skewed distribution is indicated. The results of the measures of central tendency as shown on Table 2 revealed low indices of mean, median and mode. The trend of performance in 2004/2005 was generally poor with a mean of 37.97; median of 38.63; and a modal value of 32.75. The performance of the control group as shown on Table 3 shows that 52.2 percent of the students scored below 40, which is the pass mark; 46.5 percent scored between 40 and 69 marks. Only 1.3 percent score above 70 marks. Table 3 shows a lopsided performance of the control group towards the poor mark region, that is, a positively skewed distribution.

Research Question 2:

What was the trend of the university students' academic performance when Study Technology was used in their preparation?

The results of the measures of central tendency as shown on Table 2 showed an improvement of the indices over the academic performance of the control group of 2004/2005 session. The mean value for 2006/2007 experimental group was 48.63 while the median and the mode were 50.88 and 42.82 respectively. The relationship between the measures of central tendency is: Mean < Median > Mode. This relationship exhibited slight positively skewed distribution. The trend of academic performance is shown in Figure 2. The performance of the experimental group as shown on Table 3 revealed that 18.0 percent scored below 40 which is the pass mark; 70 percent scored between 40 and 69 marks, while 12.0 percent scored 70 marks and above. Table 3 shows an evenly spread of performance when grouped according to grade point classification thus showing an almost normal curve distribution.

Research Questions 3:

Was there any improvement in the trend of academic performance of university students when Study Technology was used as against the use of lecture method?

In comparing the trend of academic performance of the students within the period of the investigation, Table 2 revealed that the trend in their measures of central tendency are similar that is, the mean is less than the median and the median is greater than the mode. (Mean < Median > Mode). The range and the standard deviation however showed a difference in the trend of performance of the two groups. The

range and standard deviation of the control group (2004/2005 session) were 65 and 13.43 respectively. In the experimental group, the range and the standard deviation were 80 and 15.85 respectively. The measures of dispersion that is, range and standard deviation shows that the experimental group performance is widely spread than the control group. The values of the measures of central tendency even though showed similar trend, revealed that actual performance of the experimental group was better than the control group. This is because all the indices of the measures of central tendency, this is the mean, median and mode of 2006/2007 experimental group were higher than that of the 2004/2005 control group. The difference between Figure 1 and Figure 2 could be attributed to the difference and improved values of the measures of central tendency of the experimental group over the control group.

Table 3 gives a clearer picture of the trend of the academic performance. It shows that the failure rate was drastically reduced from 52.2 percent of the control group to 18 percent in the experimental group. Students who scored above 70 marks also increased from 1.3 percent in the control group to 12.0 percent in the experimental group. The number of students within the middle group performance also increased from 46.5 percent in the control group to 70 percent in the experimental group. The trend of performance has shown on Table 3 shows that while the performance of the control group appeared to be positively skewed the experimental group performance tended towards normal distribution and scores were evenly distributed.

Hypothesis Testing

The main hypothesis raised for this study is: There is a significant difference in the academic performance of university students in a course of study when study technology was used in place of lecture method.

In testing the above hypothesis, a t-test was conducted on the summary of results obtained from the data collected. The result of the t-test is presented in Table 4.

From Table 4, the calculated value of t which is 13.49 is greater than the absolute value of t on the t-table, i.e. 1.960. This means that the hypothesis that there is a significant difference in the academic performance of university students in a course of study when study technology was used in place of lecture method is accepted.

Discussion of findings

This study assessed the effect of study technology on the academic performance of university students in a Nigerian university where the new technique has been experimented for the first time in 2006/2007 session. The results of this study have shown that the trend of performance was identical before and after the experimentation. This shows that the characteristics of both samples are identical even though the test results used were from two different sessions. However, while the result before the use of Study Technology was generally poor, the exposure of university students to Study Technology greatly improved their performance. This is to corroborate the assertion of Applied Scholastics International (2007) that study technology has potential to greatly improve learners' mastery of course being studied. The implication of this finding is that if university students are exposed to study technology as a mode of instruction, their performances in the courses they offer will greatly improve.

This study has also shown a more widely spread academic performance among the university students when Study Technology was used in their preparation. This may be indicative of the opportunity the technique offered individual students to go at his or her pace and express their innate ability without unnecessary competition. Each student is given the ability to find his or her academic level during course of instruction and evaluation using the Study Technology mode. The use of study technology has greatly reduced the failure rate and increased the distinction level of students exposed to the technique in the course of instruction. This result also corroborates the claims that Study Technology consists of tools and techniques teachers can use to improve learning rates of their students. (Applied Scholastics, 2007). This may be due to the fact that study technology enhances understanding of concepts and ideas and also helps in the mastery of the subject under consideration. Study Technology has assisted in improving students' performance.

Implication for Academic Staff Capacity Development

The recruitment of teachers into the Nigerian University System is without recourse to any teaching qualification. Consequently, majority of university teachers are only competent in their area of specialization. This might have resulted in the predominant use of lecture method which lecturers were familiar with during their university days. However, the National Policy on Education (1998) in section 6, subsection 58 requires that all teachers in educational institutions should be professionally trained. In section 6, subsection 47 of the same Policy, it is stated that "all teachers in tertiary institutions shall be encouraged to undergo training in the methods and techniques of teaching". The recent call by the Nigerian Universities Commission (NUC) that university lecturers must undergo a postgraduate training in education to expose them to teaching methodologies may be in response to the requirement of the National Policy on Education (1998) and buttress the need for capacity development in the area of teaching pedagogy for the academic staff in order to achieve greater results in the academic performance their students.

According to Local Initiatives Support Corp (LISC) (2008), Human capital development represents the knowledge, skills and abilities that make it possible for people to do their jobs. It will also enable an individual to be a productive worker in the global economy of the twenty-first century. Study technology is a highly skillful method of making learner learn how to learn. It can not be used by a novice. The Nigerian university teachers require a heavy investment in education, training and coaching to benefit from using Study Technology. That was why the Education Trust Fund in Nigeria in collaboration with another non-governmental agency were saddled with training a sample of three (3) lecturers each from higher institutions of learning, especially teacher education institutions, on Study Technology in 2006. The graduates of the training were certified master trainers on Study Technology. This study has established a great positive effect of Study Technology on the academic performance of university students. It is imperative therefore that academic staff of Nigerian universities be exposed to this technique to improve upon the quality of education and instruction which is currently on the decline.

Conclusion

This quasi-experimental study has examined the impact of Study Technology, a new method of teaching, on the academic performance of Nigerian university students. The results of the study showed that Study Technology had a significant positive impact on students' academic performance. The method has improved the success rate and changed the trend of performance from positively skewed to a normal distribution.

Recommendation

In view of the results from this study, lecture method can no longer be depended upon to bring the desired academic performance and education quality. For improved education quality, Hershberg (1996) canvassed for major pedagogical reform. It is recommended that a more practical, involving and activity centered method that will engage both the lecturer, instructor and the students in the learning environment be used in the university system. This is to support Hershberg (1996) call for the establishment of rigorous academic standards and teaching methods that involves team work rather than isolated individual effort. Study Technology will adequately serve this purpose (Slaughter, 2008). Lecturers, instructors and students should be made to undergo the basic training of learning how to learn, a segment of Study Technology to introduce them to the demands of the technique and a prelude to the full implementation of Study Technology as a method of instruction at that level. This will help in satisfying the requirement of the National Policy on Education (1998) in section 6, subsection 60 which calls for teacher education to continue to take cognizance of changes in methodology and in the curriculum of teachers' preparation.

Limitation of the Study

Study Technology being a new method introduced to the students initially met with some resistance. This was due to the total deviation of study technology from all the trappings of the lecture method. This was however overcome as the study progressed and students become familiar with its requirements. The procurement of the course text by the students was also one of the major constraints during the investigation since it was available for a fee which some students were not willing to obtain. The affected students were encouraged to obtain a copy of the text from their colleagues who offered the same course the preceding year. This assisted in ameliorating the constraint.

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APPENDIX A

Table1:   The Distribution of students in Educational Management Department by their combinations in 2004/2005 and 2006/2007 sessions.

Combinations	Number of Students	
Science	2004/2005	2006/2007
EDM/BIO	07	5
EDM/CHE	-	3
EDM/MAT	17	9
EDM/ISC	3	2
EDM/GEO	3	4
EDM/COMP	2	1
TOTAL (SCIENCE)	**32**	**24**

SOCIAL SCIENCES		
EDM/ECO	395	280
EDM/POL	61	20
EDM/SOS	157	129
TOTAL (SOCIAL SCIENCE)	**613**	**429**
ARTS		
EDM/CRS	-	07
EDM/ISS	03	01
EDM/YOR	05	06
EDM/ENG	14	17
EDM/FRE	-	01
EDM/PES	10	14
TOTAL (ARTS)	**32**	**46**
GRAND TOTAL	**677**	**499**

Table 2:   Summary of students performances in the course of study: EDM, 312: School Public Relations in 2004/2005 and 2006/2007 session with their respective measures of central tendencies and dispersion.

	2004/2005 Session		2006/2007 Session	
Scores obtained	Number of Students		Number of Students	
	(f)	f'	(f)	f'
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	mean <median> mode		mean < median > mode	

Table 3: *Summary of Performances of the control and experimental group by grade points and percentages.*

Scores	Grade Point	Control group Numbers of Students (f)	%	Experimental group Number of Students (f)	%
0-39	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	21.9
60-69	4	53	7.9	100	19.1
70-100	5	9	1.3	63	12.0
	Total	**672**	**100**	**523**	**100**

APPENDIX B

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Table 4: *Showing results of hypothesis testing and t-test values*

	Experimental Group	Control Group	df	α	t
N	523	672	1193	0.05	t_{cal} = 13.49
$\overline{X}$	48.63	37.97			
S^2	251.22	180.36			t_{table} = 1.960

Fig. 1: The trend of academic performance in 2004/2005 in a course of study (EDM 312: School Public Relations)

Fig 2: The trend of academic performance in 2006/2007 in a course of study (EDM 312: School Public Relations)