
Effect of Educational Technology on the Performance of High School Students: A Study of Selected Secondary Schools in Owerri Municipal Council of Imo State, Nigeria.

Leonard Ifeanyi AMAEFULE
Department of Accountancy,
Imo State University Owerri, Nigeria.

Abstract

This study evaluated the effect of educational technology on students' performance in selected secondary schools in Owerri municipal council, Imo State. The study was necessitated by the seemingly gap in literature in the subject area with respect to Nigeria context and the poor performance of students in JAMB examinations since the inception of the computer-based exams. Three secondary schools in Owerri municipal council were selected for the study and a sample of 30 teachers was drawn. Simple percentage was employed in analyzing the data collected and one sample t-test was utilized in testing the hypotheses with the aid of SPSS version 21. Findings from the analysis and tests statistics revealed that educational technology has a significant positive effect on secondary school students' performance in terms of their continuous assessment, internal examinations as well as external examinations. The study recommended, among other things, that educational regulators and policy makers should pay more attention in institutionalizing a technological-based system in our secondary schools. The use of computers and other modern gadgets for both internal and external examinations should be made compulsory; and teachers' skills must be regularly improved on the use of modern technologies for preparation of instructional materials and teaching process.

Keywords: Educational Technology, Performance, Continuous Assessment, Internal and External Examination.

INTRODUCTION

The uniqueness of man as a special creature of God is prominently signified in the distinct innate faculty which sets him apart from other living creatures. Consequently, man naturally quests to know and learn new things; hence the reason for new discoveries and technologies that aid his live and endeavors. Man's quest for ways of learning that are easier, faster, surer and less expensive, according to Molenda (2008) in Anyasodo (2016), started by developing early tools such as painting on cave walls, among other ways.

In the course of time however, various kinds of abacus have been invented and used in the course of learning by man; materials like writing slates and blackboards were developed and used in the early times of conventional teaching and learning; books and pamphlets were also later employed which in fact have immensely contributed and still contribute to the educational objectives. Besides, more recently, media and other forms of contemporary technologies have been employed in the teaching and learning process, specifically for instructional purposes. The use of technological aids like media for teaching activities is generally traced to the first decade of the twentieth century (Saettler, 1990). All these developments in the teaching and learning process are targeted at satisfying man's quest for easy way of learning and improvement in his educational performance.

It is evident therefore that advancement in technology leaves significant impact in every endeavors of man including his education; hence, Grinager (2006) argues thus: “there is no doubt that information and communication technologies have changed the world in which we live. They have enabled us to communicate, learn, work and relate to one another differently. The question therefore is, “how has the adoption of technological discoveries in educational activities (educational technology) affected the performance of students in Nigeria high school system generally and in Owerri Municipal Council of Imo State in particular”?”

Educational technology as defined by the Association for Educational Communications and Technology (AECT) cited in Robinson (2016) is the study and the ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources. Grinager (2006) on his part views education technology typically as the use of hardware, software and other digital technologies to advance learning, teaching and administration in K-12 and postsecondary education settings.

Generally, educational technology consists of the use of both physical hardware and educational theoretic. Thus, it encompasses several domains including learning theory, computer-based training, online and mobile learning (m-learning). Also, the subject “educational technology” covers such areas as electronic learning (e-learning), instructional technology, the use of information and communication technology (ICT) in education, EdTech, multimedia learning, technology-enhanced learning (TEL), computer-based instruction (CBI), computer-based training (CBT), computer-aided instruction (CAI), internet-based training (IBT), flexible learning, web-based training (WBT), online education, digital education collaboration, distributed learning, multimodal instruction, virtual education, virtual learning environment (VLE), among others.

Obviously, the procurement of most of these aspects of educational technology entails huge capital expenditure; however, it is believed that the effect and contribution in the achievement of the educational goals makes the expenditure worthwhile; as such, many schools today are investing largely on educational and instructional technology such as mobile devices, computer hardware and software, modern boards, e-books, e-library, virtual cameras, et cetera. Professional institutions and educational regulatory agencies have also incorporated this (educational technology) in the discharge of their professional duties and thus require educational institutions to align with this current trend of teaching and learning.

However, statistics have shown that most students still perform very poorly in external examinations in Nigeria particularly JAMB exams since the inception of computer-based examinations; this may not be unconnected with the yet prevailing outdated means of conducting educational activities in the country vis-à-vis the modern technological methods employed in conducting educational activities in most other part of the world. Hence, Anyasodo (2016) argued that generally, education in Nigeria is yet to come to terms with current technological advancements as obtained in many parts of the world.

It is therefore of concern to this study that many examination bodies in Nigeria today have adopted the use of advanced technological processes in the conduct of their examinations for high school students without such similar equipment being used in teaching and preparing the students for examinations during class works and lessons. Can we therefore say that the use of educational technology has contributed positively and significantly in the performance of secondary school students in Nigeria?

Besides, the researcher is bothered about the seemingly dearth of literature specifically addressing the impact of educational technology on secondary school students’ performance in Nigeria, with particular focus on Owerri municipal council of Imo State. The

need for an empirical study in this regard becomes both timely and essential to bridge this outstanding gap in literature.

This study therefore seeks to evaluate the effect of educational technology on the performance of secondary school students of selected schools in Owerri municipal council of Imo state, Nigeria.

Study Hypotheses

The following hypotheses are formulated in the study:

- **H0₁:** Educational technology has no significant effect on students' performance in their continuous assessment.
- **H0₂:** Educational technology has no significant impact on students' performance in their internal examinations.
- **H0₃:** There is no significant relationship between educational technology and students' performance in external examinations.

REVIEW OF RELATED LITERATURE

Conceptual Framework: The concept of Educational Technology and Students' Performance

The term "technology" according to Flanagan (2008) means the technical means people use to improve their surroundings. People use technology to improve their ability to do work. Classrooms around the world have implemented many forms of technology to enhance students interest and achievement. The application of technological facilities in solving educational problems is safely regarded as educational technology.

The Association for Educational Communications and Technology (AECT) in Robinson (2016) defines educational technology as the study and the ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources.

The Encyclopedia of Educational Technology defines the subject as "a systematic, iterative process for designing instruction or training used to improve performance. Spector (2015) posits that educational technology involves the disciplined application of knowledge for the purpose of improving learning, instruction and/or performance. It is a field involved in the facilitation of human learning through systematic identification, development, organization and utilization of a full-range of learning resources and through the management of these processes.

Grinager (2006) on his part views educational technology typically as the use of hardware, software and other digital technologies to advance learning, teaching and administration in K-12 and postsecondary education settings.

According to National Teachers' Institute (NTI), educational technology is a field that applies relevant knowledge, processes or products to solve educational problems. Davies (1978) cited in NTI identifies three concepts of educational technology which represents three different approaches to educational technology. These include educational technology as hardware, as software and as system approach.

There are many ways to measure student achievement. Grades, test scores, graduation rates, and the acquisition of skills are popular barometers of how well students are progressing in their formal learning (ISTE, 2008).

According to a summary of research findings on technology's impact in the classroom (www.apple.com/education/research), gaining technological proficiency helps students learn more effectively and it also improves their desire to learn. One study shows that students who have access to laptop computers explore topics on their own and work longer on school projects. In an interesting side note, the same study revealed that students with regular access to laptops are more confident in their computer skills; and that confidence often translates into better performance in the classroom. One of the most important contributions technology makes in the classroom is how it affects students' attitudes toward learning. Studies have shown that when technology is a routine part of their school experience, student attendance improves and dropout rates decline.

The provision of information and communications technology (ICT) to schools and its use for educational purposes can increase student achievement in at least two ways. First, the availability of ICT in the classroom shifts the level of educational inputs and could thus affect students' learning outcomes. Second, exposure to ICT may increase the cognitive abilities of students, allowing them to learn faster. Computer-aided instruction may be more relevant in a context in which teacher quality is poor, which is the case in most developing countries (Carrillo, Onofa & Ponce, 2010).

ISTE (2008) established that technology is being effectively integrated into teaching and learning and is having a positive impact on increasing student achievement through test scores and the acquisition of 21st century skills. Thus, it is clear that investing time and resources in education technology initiatives is paramount in local, state, and federal policy

According to Agun and Imogie (1988), the behavioural science concept of educational technology has had the following positive influence: it shifted emphasis from products (concrete things as aids to instruction) to the process of instruction; it encouraged the application of research results to the design of instruction; it encouraged a holistic approach to educational problems by re-emphasizing the view of the educational enterprise as a system with sub-systems that are intrinsically related; it encouraged the development of procedures and methods for identifying and analyzing educational problems and for finding solutions to them; and it encouraged the development of procedures and strategies for effective and efficient utilization of ideas and resources to improve the quality of education.

Appling (2015) asserted that evidence from literature indicates that incorporating technology into the classroom raises student motivation and consequently learning. He further asserted that Because of technology, teachers are now able to motivate students in ways that were previously not possible. The Internet has a wealth of information that is given in a variety of media to help students gain further knowledge of concepts taught in the classroom. Videos, songs, games, text, and social media all play a role in the development of the 21st century learner. These mediums offer unique learning experiences for students in today's 1:1 classroom.

According to Kurt (2010), technology can be used to restructure and redesign the classroom to produce an environment that promotes the development of higher-order thinking skills. However, the poor level of infrastructural development in many developing nation (Nigeria inclusive) has affected the level of educational technological advancement in the school system. Hence, Bello (2014) argued that increasing technology intervention in rural schools is still a herculean task, especially with the lack of adequate infrastructures and limited resources. In a similar vein, Higgins, Xiao and Katsipataki (2012) held that there is no doubt that technology engages and motivates young people; however, this benefit is only an advantage for learning if the activity is effectively aligned with what is to be learned. It is therefore the pedagogy of the application of technology in the classroom which is important: the how rather than the what.

Kmitta and Davis (2004) opined that computer technologies generally have a positive effect on academic achievement. Keser, Uzunboylu and Ozdamli (2011) opined that technology increases students' collaboration. Collaboration is a highly effective tool for learning. Students cooperatively works together to either create projects or they can learn from each other by reading the work of their peers.

Theoretical Framework

This study is basically hinged on two theories in education namely; Cognitive Flexibility Theory and the Theory of Diffusion of Innovations.

Cognitive Flexibility Theory: This theory was proposed and advocated by Rand Spiro and others (Ouyang & Stanley, 2014). According to the authors, this theory comes from cognitive theory represented by Jean Piaget (1898-1980), Jerome Seymour Bruner (1915) and David P. Ausubel (1918-2008). Its adherents believe that the learning process takes place in complex and ill-structured domains. Cognitive flexibility theory holds that learning must have its specific environment but it needs informational support from various fields. Instruction must be able to provide students with a variety of learning scenarios so that students have a vast space to construct their knowledge, and can take appropriate strategies to learn in a specific context. This theory greatly influences network and interactive technologies, and has been widely applied in medical and public health fields. This study adopts this theory as part of its framework because the postulations of the theory are in tandem with the realities about educational technologies in Nigerian schools.

The Theory of Diffusion of Innovations: This theory aims to explain the model of receiving every innovation. In the field of educational technology, this theory is mainly applied in the educational technology training. The theory of diffusion of innovation describes the steps of technology innovation, process and characteristics of accepting new technologies, as well as receivers' role in the receiving process of technological innovation. Everett M. Rogers groups people according to the degree of acceptance of innovation, into various stages: innovators, early adopters, early followers, late followers and laggards. Understanding the trainees' receiving capacities of new technologies can assist training institutions and trainers to design and deliver the training more effectively.

Empirical Review

Some empirical literatures were reviewed in the course of carrying out this study; as follows: Barrow, Markman and Rouse (2009) studied on the educational benefits of computer-aided instruction under the technology's edge and found that an instructional computer program for pre-algebra and algebra in the United States had a positive effect on test scores.

Similarly, Banerjee, Cole, Duflo and Linden (2007) found that computer-assisted mathematics instruction raised mathematics scores of fourth-grade students in Vadodara, India (at least in the short run).

A Summary of Research Findings on Technology's Impact in the Classroom (www.apple.com/education/research) revealed that students, especially those with few advantages in life, learn basic skills—reading, writing, and Arithmetic better and faster if they have a chance to practice those skills using technology; technology engages students, and as a result they spend more time on basic learning tasks than students who use a more traditional approach; technology offers educators a way to individualize curriculum and customize it to the needs of individual students so all children can achieve their potential; students who have the opportunity to use technology to acquire and organize information show a higher level of comprehension and a greater likelihood of using what they learn later

in their lives; technology can decrease absenteeism, lower dropout rates, and motivate more students to continue on to college.

Iqbal-Shah (2015) carried out a study on the Impact of multimedia-aided teaching on students' academic achievement and attitude at elementary level and randomly sampled of 60 students divided into two groups. Pretest-posttest control group design was selected for the study and the experimental group was taught with the help of multimedia presentations whereas the control group was treated traditionally. The treatment was given for a period of 20 weeks after which questionnaire was employed in collecting data and an attitude towards Science Scale (ATSS) was used to measure the attitude of both groups before and after treatment. The independent sample *t*-test was used to analyze the data. The results of the analysis indicated that multimedia-aided teaching is more effective than the traditional one. Students' attitude towards science improves more if multimedia-aided teaching method is used as compared to the traditional method of teaching.

Schacter (1999) carried out a review of 13 meta-analyses and four large-scale studies and concluded that Computer Based Instruction (CBI), the most widely implemented and studied computer technology, moderately improves student learning.

Bulut and Delen (2011) examined the effects of information and communication technology (ICT) on students' mathematics and science achievement. The study conducted with 4,996 students in Turkey, obtained data from the results of the Program for International Student Assessment (PISA), a standardized test given to 9th grade students. The study results indicated that students' exposure to ICT at home and school has a positive impact on their mathematics and science achievement scores. Also, students who spent more time using technological facilities were shown to have increased science knowledge; they also performed better on mathematics skills. Results also showed that ICT has a positive effect on students learning and should be included in classroom instruction.

A study conducted by Baytak, Tarman and Ayas (2011) found that most students featured in the sample believed that their learning is improved by integrating technology into classroom curriculum. The study revealed that using technology in school makes learning fun and spurs them to learn more. The study found that technology makes learning interesting, enjoyable and interactive.

From the empirical review, it is clear that most of the available studies are foreign-based. A study on the subject matter in Nigerian circumstance appears absent or at least scanty in literature, hence, the timeliness of the present study.

METHODOLOGY

This study adopted survey research method in its design. Survey research is the design where the researcher studies the population by selecting and studying samples chosen from the population to discover the relative incidence, distribution and interrelations of sociological and psychological variables. This study adopts the method (design) because its main objective is to ascertain the interrelationship (effect and/or impact) of educational technology on students' performance in terms of their continuous assessment, external and internal examinations performances. This objective is achieved by carrying out a survey of opinions of some teachers from among the population of the study; hence, survey research method is considered the most appropriate design for the work.

This study covers three secondary schools (namely; Ikenegbu Girls Secondary School Owerri, Government Technical College Owerri and Emmanuel College Owerri) in Owerri municipal council of Imo State selected at random using simple random sampling. The total number of teachers in these three schools forms the population of the study which is 262 comprising of 114 for Ikenegbu Girls secondary school; 89 for Government Technical

College (GTC) Owerri and 59 for Emmanuel College Owerri (*Source: Ministry of Education Owerri, Imo State*). The sample size drawn from the population is 30. The sample size is justified by the assertion of Balsely and Clover (1988) cited in Bessong and Charles (2012) that it is common in research studies to use 10 percent sample size, because sample size of 10 percent of the population has been proved to be more than adequate in research projects. Ogolo (1996) cited in Bessong and Charles (2012) corroborated this when he posited that where a population is known, at least 10 percent of it constitutes a researchable sample. Therefore, 10% of the population of this study would be 26.2; hence, the author approximated the sample size to 30. The 30 persons forming the sample are segregated among the three schools as follows: Ikenegbu Girls Secondary School ($114/262 \times 30$) =13; Government Technical College Owerri ($89/262 \times 30$) =10 and Emmanuel College Owerri ($59/262 \times 30$) = 7; totaling 30. The data used for the analysis of this study were collected with the aid of questionnaire administered on the sampled respondents. The items in the questionnaire were segregated into two sections – A & B. Section ‘A’ provides information on the relevant bio-data of the respondents while section ‘B’ contains seven questions related to the subject matter, three of which (questions 3, 5 & 6) were specifically for the achievement of the research hypotheses). Likert-type questions were adopted in structuring the questions having options as: Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD). The method of data analysis adopted in the study is descriptive statistics in which case simple percentages were used to interpret the weight of each of the categories of responses (namely; SA, A, D and SD) on a given question; while one-sample t-test was employed in testing the hypotheses of the study with the aid of Statistical Package for the Social Sciences (SPSS) version 21. The study allowed a maximum error of 5%; therefore, the decision criteria is to accept the null hypothesis and reject the associated alternative if the t-statistics (probability) value is greater than (>) 0.05; otherwise, the null hypothesis is rejected and the alternative accepted when the t-statistics (probability) value is less than (<) or equal to 0.05.

RESULTS AND DISCUSSION

The data collected from the 30 respondents sampled in this study are presented on tables 1, 2 and 3; although only the responses on the three key questions relating to the “study’s hypothesis” are presented and analyzed. The three questions are question numbers 3, 5 and 6 on the questionnaire.

Table 1: Responses on Question 3: The application of technological facilities in the educational system of our society has improved the performance of students in their continuous assessment

Responses	Ikenegbu Girls Sec. School	Govt. Techn. College	Emmanuel College	Total Responses	%
SA	3	5	2	10	33%
A	5	2	3	10	33%
D	2	2	1	5	17%
SD	3	1	1	5	17%
Total	13	10	7	30	100%

Source: Data from Researcher’s Field Survey, 2018.

From the analysis on table 1, 10 respondents out of the sampled 30 strongly believed that the application of technological facilities in the educational system of our society has improved the performance of students in their continuous assessment. These views represent 33% of the

total sample. Also, 10 respondents (representing about 33%) believe that application of technological facilities in the educational system of our society has improved the performance of students in their continuous assessment while 5 respondents (that is about 17%) disagrees to this assertion. 5 respondents (17%) in the same vein strongly refused the authenticity of the assertion. From this, we can conclude that application of technological facilities in the educational system of our society has improved the performance of students in their continuous assessment. However, the significance of this result is tested later in section.

Table 2: Responses on Question 5: Educational Technology has impacted on secondary school students' performance in their internal examinations

Responses	Ikenegbu Girls Sec. School	Govt. Techn. College	Emmanuel College	Total Responses	%
SA	4	2	2	8	27%
A	3	4	2	9	30%
D	3	3	1	7	23%
SD	3	1	2	6	20%
Total	13	10	7	30	100%

Source: Data from Researcher's Field Survey, 2017.

Table 2 reveals that 8 respondents, representing 27% of the sample strongly agreed that educational technology has impacted on secondary school students' performance in their internal examinations. 9 respondents (representing about 30%) agreed that educational technology has impacted on secondary school students' performance in their internal examinations. 7 respondents (that is about 23%) disagrees to this assertion while 6 respondents (20%) strongly disagreed with the assertion. From this, we can affirm that that educational technology has impacted on secondary school students' performance in their internal examinations. However, the significance of this result is tested later in this section using one-sample t-test.

Table 3: Responses on Question 6: Educational technology has positive relationship with students' performance in their external examination

Responses	Ikenegbu Girls Sec. School	Govt. Techn. College	Emmanuel College	Total Responses	%
SA	3	4	2	9	30%
A	4	3	2	9	30%
D	4	2	2	8	27%
SD	2	1	1	4	13%
Total	13	10	7	30	100%

Source: Data from Researcher's Field Survey, 2017.

The analysis on table 3 shows that 9 respondents (which represents 30%) of the sample strongly agreed with the assertion that educational technology has positive relationship with students' performance in their external examination. Similarly, 9 respondents (30%) also showed their mere agreement on the assertion. 8 respondents (about 27%) of the sample however disagreed with the assertion, just as 4 respondents (approximately 13%) refuted the assertion in strong terms. It could thus be safe to affirm (based on the majority opinion of the analysis above) that educational technology has positive relationship with students' performance in their external examination. The significance of this result however is subject to test statistics as is conducted later in this section using one-sample t-test.

Test of Hypotheses

To test the three hypotheses formulated in the earlier section of this study, the aggregate values of each of the four options of responses are adopted. The values from table 1 will be used for testing hypothesis 1, that of tables 2 and 3 are used for testing hypotheses 2 and 3 respectively. Table 4 below gives a summary of the values.

Table 4: Summary of Data used for hypotheses tests

Responses	Hypothesis 1	Hypothesis 2	Hypothesis 3
Strongly Agreed (SA)	10	8	9
Agreed (A)	10	9	9
Disagreed (D)	5	7	8
Strongly Disagreed (SD)	5	6	4

Source: Extracts from tables 1, 2 & 3.

Table 5: Test of Hypothesis Result

One-Sample Statistics						
	N	Mean	Std. Deviation	Std. Error Mean		
Hypoth.1	4	7.5000	2.88675	1.44338		
Hypoth.2	4	7.5000	1.29099	.64550		
Hypoth.3	4	7.5000	2.38048	1.19024		
One-Sample Test						
	t	df	Sig. (2-tailed)	Test Value = 0 Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Hypoth.1	5.196	3	.014	7.50000	2.9065	12.0935
Hypoth.2	11.619	3	.001	7.50000	5.4457	9.5543
Hypoth.3	6.301	3	.008	7.50000	3.7121	11.2879

Source: SPSS Version 21 Analysis Result, 2017.

From table 5, the t-statistics result for the first hypothesis is 5.196 while the significance (probability) value is 0.014. On the other hand, the t-statistics result for the second hypothesis is 11.619 while the significance (probability) value is 0.001. For the third hypothesis, the t-statistics result is 6.301 while the significance value is 0.008. These results indicate that the significance (probability) values for each of the three hypotheses is less than 0.05 with positive t-value; which indicate that a significant positive effect exists. The null hypothesis of each of the three hypotheses is therefore rejected paving way for the associated alternative hypotheses.

DISCUSSION OF FINDINGS

The findings from the results of the tests statistics conducted above are discussed as follows:

- **For Specific Objective 1:** This study finds that educational technology has a significant positive effect on secondary school students' performance in terms of their continuous assessment.
- **For Specific Objective 2:** This study finds that educational technology has a significant positive impact on secondary school students' performance in terms of their internal examinations.

- **For Specific Objective 3:** This study finds that a significant positive relationship exists between educational technology and secondary school students' performance in terms of their external examination.

These findings combined together indicate that educational technology has significant and positive effect on students' performance generally. This finding agrees with Baytak, Tarman and Ayas (2011) who found that most students' learning is improved by integrating technology into classroom curriculum. It is also in line with Bulut and Delen (2011) whose study indicated that students' exposure to ICT at home and school has a positive impact on their mathematics and science achievement scores. In fact, the finding is consistent with most of the empirical works reviewed in this study; for instance, the findings of Iqbal-Shah (2015), Barrow, Markman and Rouse (2009), Banerjee, et al (2007), among others.

CONCLUSION AND RECOMMENDATION

Based on the findings of the study, it is therefore concluded that the dawn of technology in the educational system of secondary schools in Nigeria has warranted significant improvement in the performances of the students. This has obviously aided learning in the recent times. The era of educational technology is therefore preferred than the era of traditional education system. Technological facilities are veritable aids to teaching and learning in the Nigeria secondary school system. The introduction of modern teaching aids in the secondary school system has contributed to great improvement in young people's interest to go to school; hence, the reason for the increase in school enrollment. Consequently, the study renders the following recommendation:

- Educational regulators and policy makers should pay more attention in institutionalizing a technological system in our secondary schools. The use of computers and other modern gadgets for both internal and external examinations should be made compulsory.
- Teachers' skills must be regularly improved on the use of modern technologies for preparation of instructional materials and teaching process.
- Students should appreciate learning with the available technological aid in order to be relevant in the modern world as e-tech is the main thing now.
- There is need for the school managers to employ educational technological facilities in preparing/examining the students internally before they are set for external exams.
- Educational technology should be employed even right from primary educational level.

REFERENCES

- Agun, I., & Imogie, I. (1988). *Fundamentals of educational technology*. Ibadan: Y-Books.
- Anyasodo, E. C. (2016). *Assessing the impact of educational technology on students' performance in secondary school in Owerri North L.G.A.* PGDE Project submitted to National Teachers Institute (NTI) Kaduna.
- Appling, T. (2015). The effect of 1:1 technology on student achievement. A Master's Thesis in Library and Informational Services, Department of Educational Leadership and Human Development, University of Central Missouri.
- Association for Educational Communications and Technology (AECT) (1972). The field of educational technology: A statement of definition. *Audio-Visual Instruction*, 17(8), 36-43.

- Banerjee, A., Cole, S., Duflo, E. & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India.” *Quarterly Journal of Economics* 122(3): 1235-1264.
- Barrow, L., Markman, L., & Rouse, C. (2009). Technology’s edge: The educational benefits of computer-aided instruction. *American Economic Journal: Economic Policy*, 1(1), 52-74.
- Baytak, A., Tarman, B., & Ayas, C. (2011). Experiencing technology integration in education: Children’s perceptions. *International Electronic Journal of Elementary Education*, 3(2), 139–151.
- Bello, A. A. (2014). *Impact of technology interventions on student achievement in rural Nigerian schools*. Walden Dissertations and Doctoral Studies, Walden University Scholar Works.
- Bessong, P.K. & Charles, E. (2012). Comparative analysis of fair value and historical cost accounting on reported profit: A Study of Selected Manufacturing Companies In Nigeria. *Research Journal of Finance and Accounting*, 3(8), 132–149.
- Bulut, O, & Delen, E. (2011). The relationship between students’ exposure to technology and their achievement in science and mathematics. *The Turkish Online Journal of Educational Technology*, 10(3); 311–317.
- Carrillo, P., Onofa, M. & Ponce, J. (2010). *Information Technology and student achievement: Evidence from a randomized experiment in Ecuador*. IDB Working Paper Series No. IDB-WP-223
- Flanagan, J. L. (2008). *Technology: The positive and negative effects on student achievement*. Master’s Thesis in Education and Human Development, The College at Brockport: State University of New York.
- Grinager, H. (2006). How Education Technology Leads to Improved Student Achievement. *Education Issues: National Conference of State Legislatures*
- Higgins, S., Xiao, Z., & Katsipataki, M. (2012). The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation. School of Education, Durham University.
- Iqbal-Shah, M. K. (2015). Impact of multimedia-aided teaching on students’ academic achievement and attitude at elementary level. *US-China Education Review A*, 5(5); 349-360.
- ISTE (2008). *Technology and student achievement: The indelible link*. Online publication of International Society for Technology Education.
- Kmitta, D., & Davis, J. (2004). Why PT3? An analysis of the impact of educational technology. *Contemporary Issues in Technology and Teacher Education*, 4(3), 323-344.
- Kurt, S. (2010). Technology use in elementary education in Turkey: A case study. *New Horizons in Education*, 58(1), 65–76.
- National Teachers Institute (NTI). Post graduate diploma in education lecture manual on introduction to educational technology.
- Ouyang, J. R., & Stanley, N. (2014). Theories and research in educational technology and distance learning instruction through blackboard. *Universal Journal of Educational Research*, 2(2), 161-172.
- Saettler, P. (1990). *The evolution of American educational technology*. Englewood, Colorado: Libraries Unlimited, Inc.
- Schacter, J. (1999). *The impact of education technology on student achievement: What the most current research has to say*. Santa Monica, CA: Milken Exchange on Education Technology. (ERIC Document Reproduction Service No. ED430537).

Spector, J. M. (2015). *Foundations of educational technology: Integrative approaches and interdisciplinary perspective*. London: Routledge.

APPENDIX

RESEARCH QUESTIONNAIRE

Brief Introduction: I am a researcher currently undertaking a research on the title: “Effect of Educational Technology on the Performance of High School Students: A Study of Selected Secondary Schools in Owerri Municipal Council of Imo State, Nigeria” This questionnaire has therefore been drafted to enable me complete the analysis of the research; be rest assured that any information supplied will be used just for the said purpose only. Kindly give your opinion on each of the questions by ticking ‘good’ (✓) where appropriate. Accept my heartily thanks please.

Section A: Bio- Data

1. What is your gender? (a) Male (b) Female
2. What is your highest educational qualification? (a) NCE
(b) B.Ed/B.Sc M.Ed/M.Sc (d) Ph.D.
3. Identify your age bracket (a) 18yrs – 40yrs (b) 41yrs – 60yrs
(c) 61yrs – 75yrs (d) 75yrs and above

Section B: Key Research Questions

S/N	QUESTIONS	SA	A	D	SD
1.	Technological development is essential in today’s endeavors of man.				
2.	Educational system in the 21 st century cannot be efficient without technology.				
3.	The application of technological facilities in the secondary educational system of our society has improved the performance of students in their continuous assessment.				
4.	Teachers and learners are aided by technological facilities adopted in the school system.				
5.	Educational Technology has impacted on secondary school students’ performance in their internal examinations.				
6.	Educational technology has positive relationship with students’ performance in their external examination.				
7.	The overall contributions of technology in our school system is inevitable for a virile society				

Dr. Amaefule, Leonard Ifeanyi
Researcher