ROLE OF TECHNOLOGY IN ACADEMIC MOTIVATION AND PERFORMANCE AMONG SECONDARY SCHOOL STUDENTS IN LAGOS STATE: SOCIOLOGICAL IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

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Abstract*: This study examined the impact of technology on academic motivation and performance of secondary school students in Ikorodu Local Government Area of Lagos State. Four hypotheses guided the study. The study sample comprised 270 SS2 students drawn from the study population through simple random sampling technique. A structured questionnaire titled "Impact of Technology on Academic Motivation of Students Questionnaire" (ITAMSQ) and an achievement test in English Language were the instruments used for the data collection. The formulated hypotheses were tested using T-test and regression analysis statistical tools at 0.05 level of significance. The findings revealed that there is significant impact of technology on students' academic performance, and there is significant impact of technology on students' academic motivation among others. Based on the findings, this study recommends that schools must provide computer facilities accessible by all year levels to provide students with adequate opportunities to utilize computers. Available computer packages, especially in the public schools, must be maximized by encouraging students to use them more often. Students and teachers have to be made more aware and cautious regarding issues in the internet especially that they are generally active in social-networking sites. The net effect of these would be a leap in sustainable education development of the nation.*

Keywords: Technology. Academic motivation, Academic performance, Gender, Age difference.

INTRODUCTION

Education is a key to national development and the role of educational institutions is to raise and turn out products that will man the societal world of work to drive social and economic developments. Performance is key in educational pursuits and a motivated learner is a high achiever. The factors that motivate learners unto improved academic performance has been a subject of interest to researchers as it is central to the achievement of the goal of education as an instrument per excellence in the achievement of the national objectives. Studies have attributed factors that influence students' academic motivation and performance to; curriculum structure, teacher personality, teaching methods, parental involvement, peer influence and learning environment among others. Suffice it to say that ever since the use of technology made its incursion into the global education landscape peaked in the 21st century, there has been a paradigm shift from the traditional teaching-learning processes. Technology is now the way of the world.

Burgelman et al. cited in (Sazali and Raduan, 2011) refer technology as the theoretical and practical knowledge, skills, and artifacts that can be used to develop products and services as well as their production and delivery systems. Technology is also embodied in people, materials, cognitive and physical processes, facilities, machines and tools (Lin, 2003). Bozeman (2000) argues that technology and knowledge are inseparable simply because when a technological product is transferred or diffused, the knowledge upon which its composition is based is also diffused. Used to support both teaching and learning, technology

infuses classrooms with digital learning tools, such as computers and hand-held devices; expands course offerings, experiences, and learning materials, builds 21st century skills, increases student engagement and motivation; and accelerates learning. In an educational setting, technology can facilitate more flexible and democratic styles of teaching and learning, provide students with more autonomy and control over their learning, and encourage the development of cognitive competencies and understanding (Buckingham , 2003).

As technology advances, educational possibilities become limitless. The amount of information available on the Internet has increased the potential for learners to discover answers to many of their questions. Training and experience help make efficient use of that information to facilitate learning. The use of technology is changing the way things are done, including the work in schools where the teaching and learning process require a great deal of improvement. The world awaits year 2030 in great expectation being the year set for the full realization of the Sustainable Development Goals (SDGs). Sustainable development involves human societies living and meeting their needs without compromising the ability of future generations to meet their own needs. The 17 SDGs aim at achieving development in every aspect of the human society through putting an end to extreme poverty, fighting inequality and injustice and protecting our planet among others.

Fasae and Aladeniyi (2012) opined that for the developing countries like Nigeria to grow and attain its economic and social status; such country must be fully ready in strengthening and empowering its academic institutions, both in science and technological capacity. Hence, the students in their respective fields will need an array of reliable and interactive means of accessing and retrieving information without wasting much time. Similarly, the use of this Internet is greatly dependent on some associated factors such as purposes, students' experience, locations, internet facilities and services available, among others on the academic pursuit of students in their institutions.

The internet also allows students to independently engage in relevant, organized, and simplified research (Bouck, Okolo and Courtad, 2007). Web-based technologies help learners in the acquisition of various skills, such as reading, writing, and comprehension in language arts, as well as mathematical problem solving. (Saultz, 2012). Specific technology examples that have been shown to enhance student engagement include web-conferencing software, blogs, wikis, social networking sites and digital games (Schindler et al., 2017). One specific technological application that can be used in the classroom to enhance student engagement and success is Edmodo, which is a technological learning platform that can be used to facilitate online discussions, share content, distribute various forms of assessment and promote student-teacher communication (Purnawarman , Susilawati and Sundayana, 2016).

Nonetheless, challenges of teachers' effective integration of technology into their teaching curriculum abound. For instance, Flory (2012) found that some teachers even reported lower standardized testing scores while using technology in the classroom. Furthermore, it is not the use of technology itself that increases student performance and engagement but rather, its effective implementation hence, the need for proper training and motivation of teachers (Flory, 2012). Appropriately utilized technology can influence academic motivation hence, Grisham and Wosley (2006) noted that technology empowers students providing them with an opportunity to shape their own learning. Additionally, it's been observed that students' comprehension of content and development of skills such as analytical reasoning, problem solving, information evaluation and creative thinking will increase with increased implementation of technology (Panel, 2002). The use of technology is expected to support active learning of students in an educational environment to help them achieve meaningful learning that could result in positive, cumulatively progressive gains in learning outcomes. In general, studies show that students report high levels of satisfaction with the use of technology in education as it allows them to interactively engage in learning (Miller, Milholland & Gould, 2012). Students also are of the opinion that technology facilitates a greater understanding of course content, contributes to higher academic achievement and better prepares them for the

technology-dependent workforce (Schindler, Burkholder, Morad & Marsh., 2017).

However, Jacobs (2013) claims that technology itself does not necessitate academic motivation. Research shows that teachers must employ technological opportunities that provide access to a larger community or goal in order to improve a student's academic motivation (Jacobs, 2013). Furthermore, access and utilization of technology in learning especially by learners is dependent on the availability and affordability of the technological materials. Social class of parents appear to determine influence of technology on students' learning. Uche (2010) posits that parental socio-economic status have effects on the children of literate parents or families. Children from high-income families tend to perform better in school than those from poor and uneducated families. Also, the type of accommodation provided to a child also affects his ability to learn and utilize technology. Pleasant and conducive surroundings when provided will engender better concentration, understanding and enhance performance while noisy overcrowded and busy home environment tend to affect the rate of concentration of adolescents and lower their academic performance (Uche, 2010)

In view of the above, this study examined the impact of technology on academic motivation and performance of secondary school students in Lagos State.

Statement of the Problem

Education stakeholders have continued to express concern over the decline in performance of secondary school students in major external examinations such as NECO Senior Secondary Certificate Examination and West African Senior Secondary Certificate Examination (WASSCE). The school, the home and student factors have been implicated in this problem by research. In all, motivation appears to play a key role in students' eventual achievement. As teachers navigate the classroom experiences, if the learners do not feel sufficiently motivated, learning may be impeded with some detrimental outcomes for the academic performance. Highly motivated students tend to achieve at higher levels and are less likely to drop out of school. Intrinsically motivated students are often on task, monitor their own progress, and engage in more creative and potentially risky activities. Ultimately, student motivation only affects performance within the classroom, but also indicates future career success. Many studies have been carried out on the effects of technology within the classroom, but there is little research that investigates the impact of technology on academic motivation and performance of secondary school students. This study seeks to bridge this gap and determine if access to technology-based activities improve students' motivation and academic success in Lagos State.

Purpose of the Study

The main purpose of this study is to examine the impact of technology on academic motivation and performance of secondary school students in Ikorodu Local Government Area of Lagos State. This general aim is expressed in the following specific objectives which are:

1. To determine the impact of technology on students' academic performance.
2. To ascertain the impact of technology on students' academic motivation.
3. To ascertain whether the impact of technology on students' performance will differ due to parents' social class.
4. To determine whether the impact of technology on students' performance will vary due to students' age.

Hypotheses

The following hypotheses were addressed in this study;

1. There is no significant impact of technology on students' academic performance.
2. There is no significant impact of technology on students' academic motivation.
3. Parents' social class will not significantly determine the impact of technology on students' performance.
4. Age will not significantly determine the impact of technology on students' performance.

LITERATURE REVIEW

The review of related literature on the impact of technology on academic motivation and performance of students are hereby presented: Sianjina (2000) opined that technology can be used not only as an information management tool, but also as a means of reaching students of diverse backgrounds. Use of technology can help teachers relate to today's students who are very media aware, prompt to new approaches to curriculum, and encourage developments in teaching skills (Schwarz, 2000). It can also assist teachers in helping students make connections with a worldwide community (Davidson, 2000).

Current research has indicated that Information and Communications Technology assists in transforming a teaching environment into a learner-centered one (Sánchez and Alemán, 2011). Incorporating the use of several technological applications allows for students to participate in higher-order thinking, enhance communication, engage in collaborative problem-solving activities and discussions, critically reflect on content and expand digital competencies (Schindler et al., 2017). Kim and Chang (2007)'s study on "Effects of Computer Use on Academic Performance" revealed that computer use for schoolwork had significantly positive effect on achievement for overall students. Computer technology aids teachers in performing their roles as the guardian for learning in the classroom environment.

Since learners are actively involved in the learning processes in ICT classrooms, they are authorized by the teacher to make decisions and plans towards their learning outcomes (Lu, Hou and Huang 2010). Further, Serhan (2009) concluded that ICT fosters autonomy by allowing educators to create their own material, thus providing more control over course content than is possible in a traditional classroom setting. With regard to capability, once students are more confident in learning processes, they can develop the capability to apply and transfer knowledge while using new technology with efficiency and effectiveness.

In collaboration between several universities, Teo, Su Luan, and Sing (2008) explored the future intent of pre-service teachers to use technology. The survey utilized items that were validated from previous relevant research using the Technology Acceptance Model (TAM). It was noted that there were differences between Singaporean and Malaysian teachers on technology's perceived usefulness, perceived ease of use, and computer attitudes. Despite their differences in stated beliefs, there were no differences in the behavioral intention towards technology acceptance. In his study, Teo (2009) surveyed student teachers' intentions to use technology in the classroom. One hundred fifty-nine participants completed a questionnaire based on TAM. It was found that the TAM is a valid model for helping explain the use and intent of technology, as well as revealing that a person's attitude towards technology has a large influence on its use. There are many reasons why students may feel more motivated when technology is in the classroom.

Liu (2016) performed a study amongst elementary school classrooms. In this study, 31 teachers were followed over the course of eight weeks. At the end of the study, the teachers were asked the question "why did you choose to use technology in your lesson?" There were several different responses ranging from 14.8% stating that it met the individual needs of the learners to 17% stating it helped with behavior management and routines. The largest set of respondents (31.1%) stated that it helped with student engagement and motivation and helped the teachers to make more literature-based connections that were more entertaining and interesting to students.

Garcia (2019) carried out an empirical study into the influence of new technologies on the performance of students in the Spanish Baccalaureate and found that engagement with technological tools by the students has a positive influence on their performance in the sciences and language, but a negative influence on mathematics. Pandney (2008) defined academic achievement as the performance of the pupils in the subjects they study in the school which determines the pupils' status in the class. It gives children an opportunity to develop their talents, improve their grades and prepare for future academic challenges. Academic performance refers to a person's academic outcome for example in reading or language arts, mathematics, science and other areas of human

learning (Kathryn, 2010). Focus on students' academic performance by previous and current studies is quite critical in research, research literature on thi subject has remained in exhaustive.

METHODOLOGY

Population, Sample and Sampling Technique

The population of this study comprised all students in senior secondary school 2 in Ikorodu Local Government Area of Lagos State. The simple random sampling technique was used to select the participants of the study. Five schools were selected by simple random technique from the study population. The sample of the study was made of 270 SS2 students. Fifty four (54) students were randomly selected from each of the schools. One hundred and fifty (150) male and one hundred and twenty (120) female students were used for the study.

Instrumentation

The study made use of a structured questionnaire designed by the researcher titled "Impact of Technology on Academic Motivation of Students Questionnaire" (ITAMSQ) in data collection. This sought information on the demographic data of the respondents and the study variables. The student academic performance was measured with Academic Achievement Test (AAT) on English language.

Validity and Reliability of Research Instrument

Face and content validity was assured through experts' opinion and pilot study. Cronbach Alpha reliability co-efficient of 0.87 was obtained to establish the suitability and consistency.

Procedure for Data Collection and Method of Data Analysis

The instruments were administered on the participants in their various locations and retrieved upon completion. The formulated hypotheses were tested using T-test and regression analysis statistical tools at 0.05 level of significance.

RESULTS AND DISCUSSION

Hypothesis One: There is no significant impact of technology on students' academic performance.

Table 1: T-test analysis showing impact of technology on students' academic performance

Variables	X	SD	N	Df	t-cal	t-crit	Decision (0.05)
Technology	27.92	4.21	270				
Academic performance	36.04	6.64	270	268	3.71	3.34	Reject H_0

Level of significance 0.05

Table1 shows the result of the test of significant impact of technology on students' academic performance. The calculated t-value is 3.71 while the critical t-value is 3.34 at 0.05 level of significance given 268 degrees of freedom. The null hypothesis is rejected given that the critical t-value (3.34) is less than calculated t-value of 3.71. Therefore, the alternative hypothesis of "there is significant impact of technology on students' academic performance" was accepted.

Hypothesis Two: There is no significant impact of technology on students' academic motivation.

Table 2: T-test analysis showing impact of technology on students' academic motivation

Variables	X	SD	N	Df	t-cal	t-crit	Decision (0.05)
Technology	27.92	4.21	270				
Academic motivation	26.51	6.41	270	268	3.42	3.34	Reject H_0

Note: Level of significance 0.05

Evidence from table 2 shows that the calculated t-value of 3.42 is greater than the critical t-value of 3.34.

The stated null hypothesis is hence rejected while accepting the alternative hypothesis. It was concluded that there is significant impact of technology on students' academic motivation.

Hypothesis Three: Parents' social class will not significantly determine the impact of technology on students' performance.

The result of the analysis is presented in table 3:

Table 3: Analysis showing impact of parents' social class on technology and students' performance Multiple Regressions was used to analyze this. The result of the analysis is presented in table 4:

Variables	B	Std. Error	T	Sig
Constant	22.939	1.82	5.299	0.00
Parents' social class	0.309	0.702	0.440	0.661
Impact of technology	2.12	0.561	3.780	0.000
R	0.538			
R^2	0.29			
Adj R^2	0.24			
F	6.322			

Table 3 shows the quality of prediction of the dependent variable as represented by R with the value 53.8%. This represents a good prediction of parents' social class on impact of technology on students' performance through the independent variables. The proportion of variance in the extent of parents' social class significantly determine the impact of technology on students' performance that can be explained by the independent variables was 29%. The overall regression model as represented by F-ratio 6.322 is good for the data. The table also shows the extent of parents' social class significantly determine the impact of technology on students' performance with parents' social class (0.386), and impact of technology on students' performance (0.101). This shows parents' social class and impact of technology on students' performances vary positively. However, only impact of technology on students' performance (with $p < 0.05$) has significant positive relationship with parents' social class. This means that parents' social class significantly determine the impact of technology on students' performance.

Hypothesis Four: Age will not significantly determine the impact of technology on students' performance.

Multiple Regressions was used to analyze this. The result of the analysis is presented in table 4**:**

Table 4: Multiple regression analysis showing age, impact of technology on students' academic performance.

Variables	B	Std. Error	T	Sig
Constant	19.910	1.74	5.134	0.00
Age	0.305	0.702	0.440	0.661
Impact of technology	2.12	0.561	3.780	0.000
R	0.329			
R^2	0.21			
Adj R^2	0.17			
F	6.322			

Table 4 shows the quality of prediction of the dependent variable as represented by R with the value 32.9%. This represents a good prediction of age on impact of technology on students'

performance through the independent variables. The proportion of variance in the extent of age significantly determines the impact of technology on students' performance that can be explained by the independent variables was 21%. The overall regression model as represented by F-ratio 6.322 is good for the data. The table also shows the extent of age significantly determine the impact of technology on students' performance with age (0.372), and impact of technology on students' performance (0.87). This shows age and impact of technology on students' performance vary positively. However, only impact of technology on students' performance (with $p < 0.05$) has significant positive relationship age. This means that age significantly determines the impact of technology on students' performance.

Discussion of Findings

Hypothesis one states that there is no significant impact of technology on students' academic performance. This hypothesis was rejected as findings indicate a significant impact of technology on students' academic performance. The reason for this finding may be due to the fact that when teachers and learners effectively implement technology in the teaching-learning process, it enhances the quality of lesson delivery and students' mastery which eventually translates to improved academic performance. The finding supports the view of Edwards (2012) that excitement and energy factor that students elicited in his school district were from students who had access to technology in learning. Students in that school district were even inclined to miss recess to work on their projects and material in the classroom. The students in technology schools performed better than the students in non-technology schools. The finding also aligns with Shapley, Sheehan, Maloney and Caranikas-Walker (2010), who demonstrated that technology access and use were positive predictors of students' reading and mathematics scores. Furthermore , Lee and Choi (2017) found that the use of technology in the learning environment help to develop students' higher-level thinking by moving beyond simple memorization and recall; and students who exhibit higher-order thinking are more likely to be academically successful (Zohar and Dori, 2003)

Hypothesis two states that there is no significant impact of technology on students' academic motivation.

This hypothesis was rejected as findings indicate a significant impact of technology on students' academic motivation. This may be because technology provides instant feedback with instructional assistance. Thus, technology must be made relevant and useful in order for teachers to expect increased motivation among their students, especially those students who have special needs and require more attention from their teachers. This finding corroborates Spears (2012) that stating attention, relevance, confidence, and satisfaction are all important components for students when technology is being introduced effectively in the classroom. For students to have the desire to be at school and learn, teachers must keep in mind best practices for teaching, and also keep in mind what is best for students and what is going to hook them to take learning to the next level.

Hypothesis three concluded that parents' social class significantly determine the impact of technology on students' performance. This may be due to the fact that, the ability of parents to provide the needed technological gadgets or send their children to schools with well-equipped technological facilities where technology is adequately integrated into the school curriculum, lies mainly with parents of high social class who can afford that. Such students more often than not end up being high achievers academically. This finding corroborates Egbo, Agbo and Egbo (2020) who subscribed that parents of high socio-economic status make adequate provisions for their children education. They provide economic, social, psychological and emotional support to their children which make it possible for the students to perform well academically. Also, Omoraka (2013) noted that children of rich parents with high income have their needs readily met which positively contribute to their academic performance. Such needs are noted to specifically embrace; conducive reading atmosphere, provision of books and technological devices among others. On the contrary, children of low class parents lack the school essentials needed to boost their academic performance leading to low performance. Ahawo cited in Gemechu (2018) observed that in a modern society, family influence plays an important role in

the academic life of a student. Socio-economic status of families was particularly identified as a major factor that affect students' academic achievement given that when parents are unable to adequately support their children with the needed educational and technological gadgets, the students are unable to successfully pull through their studies.

Hypothesis four found that age significantly determine the impact of technology on students' performance. It should be noted that students in different stages of life may choose to use technology or respond to technology enhanced learning differently. For instance, Hawthorn (2007) found that older students have selective tendencies towards technology, limiting tasks to those they know they can do in order to minimize errors which have implications for their academic performance. This finding supports Agboola (2006), Owolabi and Ekuk-Irien (2009), Zember and Blume (2011), among others who reported that age and gender have effects on academic achievement of students. However, the finding contradicts Abubakar and Adegboyega (2012) and Ganai and Muhammmad (2013) which revealed that linear relationship exists between the independent variable (students CGPA) and the dependent variables (age and gender). Research studies on parenting subscribed that some parents make age-appropriate demands on their children for mature behaviour. For example, expecting a ten year old not to have temper tantrums where they fall on the floor and kick and scream is an age appropriate demand or expectation. Expecting a two-year old toddler to express frustration without having a tantrum is not an age-geared demand because a child that young has very few other means of expressing intense feelings. Furthermore, Garland and Noyes cited in Staddon (2020) found that older students use fewer technologies than younger students and also, older students had lower computer confidence than younger students, both for general use and learning. These produce different academic outcomes .

CONCLUSION

This study concluded that, the use of technology significantly impacts academic motivation and performance of secondary school students. Also, parents' social class significantly determines the impact of technology on students' academic performance. There is a significant age influence relative to the impact of technology of students' academic performance. Teachers should hence employ the use of diverse technologies in their classrooms as appropriate on a regular basis. Understanding the effects of certain strategies or tools can only serve to increase the overall effectiveness of instruction. Observing the impact of technological practices on student motivation and achievement provide teachers with valuable information. Teachers can then adjust their methods to better reach their students and promote a healthy learning environment for better academic outcomes.

This study has revealed that the embrace of technology in teaching-learning processes has positive outcome in relation to students' academic motivation and performance. This finding has some far reaching societal implications. The use of technology will ensure quality delivery by teachers. Also, the use of technology will enhance students' academic motivation for improved academic performance which guarantees quality workforce to drive meaningful social and economic development. This submission aligns with Gemechu (2018) who opined that education contributes to national development through provision of an appropriate human capita that helps spur productivity and eliminate poverty, disease and ignorance. The implications of technology enabled learning in schools is a majority of graduates acquiring skills for the world of work which will lead them to being employed either by government/organizations or by being self-employed leading to national development. Also, the physically challenged for instance, have technologies and computer applications suited to them to assist them in their education hence, leaving none behind in the quest to contribute to nation building .

The 4th Sustainable Development Goal (SDG4) is on Quality Education. The SDG4 is the educational goal that aims to ensure inclusion and equitable quality education and promote lifelong learning opportunities for all, and its ten targets include:

- Free primary and secondary education
- Equal access to quality pre-primary education
- Equal access to affordable technical, vocational and higher education

- Increase the number of people with relevant skills for financial success
- Eliminate all discrimination in education
- Universal literacy and numeracy
- Education for sustainable development and global citizenship
- Build and upgrade inclusive and safe schools
- Expand higher education scholarships for developing countries.

In all, intensifying the use of technology in our school system will raise the quality of education offered in our schools. Quality education itself, is a key to provide the right human resources for social and economic production sectors facilitating wealth creation and improving living standards (Abdullahi, 2011). The realization of the SDG4 is central to the realization of the remaining 16 SDGs as education is a pathway to all round social developments. However, the problem of digital divide among education stakeholders, cyberbullying and cybercrimes are some concerns of the use of technology in learning. Nonetheless, technology is the way of the world both now and in the future. Hence, this study has provided some useful recommendations that will help mitigate the problems and sustain/consolidate the benefits of technology in education unto sustainable social living.

Recommendations

Based on the finding of this study, the following recommendations are here by presented:

1. Schools must make computer facilities accessible by all year levels to provide students with adequate opportunities to utilize computers.
2. Available computer packages, especially in the public schools, must be maximized by encouraging students to use them more often.
3. Students in the lower years should be given more opportunities to utilize technology through various activities since they are just as self-efficient as the students in the higher year levels.
4. Students and teachers have to be made more aware and cautious regarding issues in the internet especially that they are generally active in social-networking sites.
5. Teachers must focus on enhancing over-all teaching effectiveness and not just rely on technology to help students learn better.
6. Parents should strive to adequately support their children educationally especially through providing the needed technological devices for their education.
7. Periodic seminars and workshops on cyber safety and dangers of cybercrimes should be organized by schools, government and other stakeholders to sensitize individuals especially the youth on the need to secure their personal information and resist the temptation of being lured into cybercrimes.

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