
Impact of ICT and Class Size On Academic Performance of Secondary School Students in Science Subject in Ekiti State

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ABSTRACT: *The study investigated the impact of ICT facility and class size on academic performance of secondary school students in science subjects in Ekiti. The purpose of the study was to investigate the impacts that both ICT facilities and class size have on the academic performance of secondary school students. The study adopted both descriptive research of the survey type and ex-post-facto designs. The sample included 110 science teachers and 2,444 students whose WASSCE were used. They were selected using multistage sampling procedure. The two research instruments used were ICT and class-size facilities questionnaires for teachers (ICTCSFQT) and Three Years Examination Result Template (TYERT). The face and content validity of the ICTCSFQT was done by experts in science Education and test, measurement and evaluation. Test-retest method was used to establish the reliability of ICTCSFQT and the coefficient of 0.76 was obtained. The other instrument (WASSCE Result) is a standardized result from WAEC. Data collected were analyzed using Pearson product moment correlation. The hypotheses raised were tested at 0.05 level of significance. The result showed that there was significant relationship between availability of ICT and academic performance in schools. The study also revealed that there is significant relationship between class-size and academic*

performance in schools. Based on the findings, it was concluded that ICT and class-size are crucial for better performance of students in science subjects. It was therefore recommended that teachers should be trained through various workshop and seminars on the use of ICT facilities, so also the significance of moderate class size for effective classroom management and control in order to improve students' academic performance.

KEYWORDS: information and communication technology (ICT), class size, academic performance, science subjects

INTRODUCTION

Science has been defined as a body of information created by scientists, whereas science education focuses on the student's acquisition of the knowledge and skills necessary to grasp the scientific principles, rules, and hypotheses. It is crucial to make certain that educators not only instruct students in scientific procedures, but also provide opportunities for students to acquire scientific concepts as a result of their teaching in the field of science education and learning. Science Education entails the dissemination of scientific principles, ideas, theories, and concepts to those who were hitherto regarded as non-scientists by the scientific community (Aina, 2013).

In the realms of science and technology, as well as in the realms of modern education, scientific education holds a valued status. Educators feel that no nation should ever overlook the teaching of science in schools, which is why scientific courses are taught all around the world. At the secondary school level, the learning of science (Physics, Chemistry, and Biology) can be affected by a few different elements, including the availability of information and communication technology (ICT) facilities and the size of the class.

According to Ching & Hsu (2011), the availability of suitable school buildings, class size, and information and communication technology (ICT) and internet facilities are important for the achievement of any educational purpose and objective. It has been noticed that the availability of information and communications technology (ICT) and internet facilities has both a good and negative affect on the academic performance of students in science disciplines. The fact that our world is transitioning towards an information-based world increases the value of information; yet, acquiring knowledge at the correct place and time is of crucial importance for both individuals and society as a whole.

With a wide range of tools and resources that may improve teaching and learning experiences, ICT has become an essential component of modern education (Mtebe & Raphael 2019). It allows for collaborative learning between students and teachers to take place through the provision of communication platforms, access to enormous information databases, and chances for interactive

learning. Therefore, doing research into the influence that ICT has on academic performance can aid in understanding the usefulness of ICT as an educational instrument.

The number of students in a class, on the other hand, is referred to as the class size. Because it has the potential to influence the standard of both teaching and learning, it plays a crucial role in education. There is a correlation between having smaller class sizes and receiving more individualised attention from teachers, higher levels of student engagement, and improved academic achievements (Oyeniran 2014). As a result, doing research on the connection between the number of students in a given class and their academic performance might yield information about the most effective learning environment for students (Mugure 2020).

The purpose of this study is to contribute to the existing body of knowledge on successful educational practises and to influence policy choices related to the integration of information and communication technology (ICT) and class management tactics in secondary schools by analysing the interaction that exists between ICT, class size, and academic performance. The findings of this study have the potential to give significant insights and suggestions to educators, policymakers, and other stakeholders in Ekiti State and abroad. As a result, secondary school students' experiences in teaching and learning science topics will likely improve as a result of the study's findings.

The effect that the number of students in a scientific class has on their overall academic performance can either be beneficial or detrimental, depending on the conditions that exist inside the classroom (Kuhlemeier & Hemker 2016). A classroom that is too packed has a detrimental impact on the teaching of science as well as the academic performance of the students. When there are more students in a school, there are also more students in each class, which might lead to problems with the students' academic performance. According to Koc and Celik (2005), class size has evolved into a phenomena that is frequently cited in educational literature as having effect on the sentiments and achievements of students, as well as on the administration, quality, and finances of schools. According to him, the number of students in a class is nearly always determined by administrators, and teachers have very little or no say in the matter.

Academic performance of students in science subjects has been observed to be on the down side over the years in Ekiti state as observed by the researchers (Olofin & Kolawole 2020). Many reasons have been adduced in literature for this poor performance of students, but it seems that much emphasis has not been placed on the students learning through ICT/internet facility and conducive class-size. The researcher observed that the academic performance of students in science subjects has been observed to be on the down side over the years in Ekiti state. The participants of the study are specifically secondary school students who are enrolled in science classes in the state of Ekiti in Nigeria. Science courses are essential for fostering scientific literacy, preparing students for further education, and preparing them for potential professions in disciplines connected to science. Learning how information and communication technology (ICT) and the

number of students in a class affect the academic performance of students in various courses has the potential to have ramifications for the improvement of scientific education in the area (Gershenson & Langbein 2015).

Based on this premise, the study purposively investigated the impacts of ICT/internet facilities and class size on the academic performance of secondary school students in science subjects.

Research Hypotheses

- (1) There is no significant relationship between internet/ICT facilities and student's academic performance in science subjects.
- (2) There is no significant relationship between class-size and student's academic performance in science subjects

METHODOLOGY

The descriptive research of the survey-type and ex-post-facto designs was used in the study. The population of the study consisted of 63,458 science students in public and private secondary schools that sat for WASSCE in the year 2020, 2021 and 2022 in Ekiti state and their 2653 science teachers. A total number of 110 science teachers and 2444 students WASSCE result from 32 public secondary schools were used as sample for the study using multistage sampling procedure.

Two set of instruments were used in the study information and communication technology and class-size facilities questionnaires for teachers (ICTCSFQT). The instrument comprised two sections, A and B. section A sought for demographic background of the science teachers such as area of specialization, sex, among others while section B contain 40 items to evaluate the impact of information communication technology/internet facilities and class size on students' academic performance with Yes or No response. Scoring system assigned 2 points for Yes while No = 1 point. The three years Examination Result template (TYERT) was used to collect the SS3 students WASSCE Results for the year 2020, 2021 and 2022. The face and content validity of the ICTCSFQT was done by experience science teachers and experts in science education and last, measurement and evaluation.

Test-retest method was used to establish the reliability of ICTCSFQT which was administered to twelve science teachers selected from four schools in Ado-Ekiti local government, outside normal sample size within the interval of two weeks. The scores obtained were subjected to Pearson Product Moment Correlation and a reliability coefficient of 0.76 was obtained. The second instrument (WASSCE Result) was a standardized result from WAEC and it requires no reliability procedure.

The researchers visited the sample schools and permission was obtained from the relevant school authority to carry out a research in their schools. Copies of the questionnaire were administered on the sampled science teachers. The data collected were analysed using descriptive and inferential statistics.

RESULTS

Hypothesis 1: There is no significant relationship between availability of information communication technology/internet facilities and academic performance in schools.

Table 1: The relationship between availability of ICT/internet facilities and academic performance in schools

Variables	N	r _{cal}	P(sig)
Availability of ICT/internet facilities	32	0.710*	0.000
Academic performance	32		

*P<0.05

Table 1 showed that the r-cal value of 0.710 is significant at 0.05 level of significance because the P-value (0.000) < 0.05. The null hypothesis is rejected. This implies that there is significant relationship between availability of information communication technology/internet facilities and academic performance in schools.

Hypotheses 2: There is no significant relationship between class size and academic performance of students in schools.

Table 2: The relationship between class size and academic performance in schools

Variables	N	r _{cal}	P(sig)
Class size	12	0.622*	0.000
Academic performance	12		

*P<0.05

Table 2 showed that the r-cal value of 0.622 is significant at 0.05 level of significance because the P-value (0.000) < 0.05. The null hypothesis is rejected. This implies that there is significant relationship between class size and academic performance in schools.

DISCUSSION

The finding revealed that there was significant relationship between the availability of information communication technology (ICT) and internet facilities and academic performance in schools. This finding supports the hypothesis that students' academic performance is positively impacted by the availability and accessibility of ICT resources, such as internet facilities (Demuyakor & Abakah, 2018). Students have access to a multitude of information and education resources because to the availability of ICT and internet facilities in schools. This gives individuals the freedom to pursue their own learning at their own pace, dig deeper into topics of interest, and discover resources for further education that go beyond the typical textbook. Student engagement

and comprehension of difficult material may be boosted with the use of ICT's interactive and multimedia-based learning experiences (Mtebe & Rapheal 2019).

ICT availability and academic performance are significantly correlated, suggesting that students who have access to these resources may be better able to learn more, think more critically, and apply what they learn more successfully in the classroom (Bello et al., 2016). In order to improve academic achievements, technology may be used in education to promote active learning, individualised instruction, and teamwork. It's crucial to remember that just having access to ICT resources doesn't always mean better academic performance. Harnessing the full potential of these technologies requires the appropriate integration of ICT into the curriculum and instructional practises, as well as competent direction and support from instructors.

It was discovered that academic performance in schools was significantly correlated with ICT / Internet facilities accessibility. According to Ching & Hsu (2011), the achievement of any educational goals and objectives requires the availability of ICT / internet facilities. Information and communication technology (ICT) has been highlighted by Mugure (2020) as a crucial teaching and learning tool that has a significant positive influence on both instructors' output and students' academic performance. According to Ndlovu (2017)'s study on the relationship between ICT and learning, teaching in a technology-based learning environment raises students' academic performance.

The ramifications of this finding for educational policymakers and principals are substantial. The need of providing schools, especially those in low-resource areas, with access to ICT infrastructure and internet facilities is emphasised. The digital gap can be reduced and more welcoming learning environments can be created by ensuring that everyone has access to these resources (Ndlovu 2017). Teachers should also be provided with opportunities to further their education in order to learn more efficient methods of using ICT in the classroom. Teachers may use technology to create more interesting and interactive courses, tailor their teachings to the requirements of their students, and help them develop digital literacy skills.

While this study focuses on the connection between ICT availability and academic performance, other factors, like teacher quality, curriculum design, and students' socioeconomic backgrounds, may also have an impact on students' academic performance (Demuyakor & Akabah.2018) To further understand how ICT affects academic performance in schools, future study might investigate the relationship between these variables. The necessity of incorporating technology into education is emphasised by the finding of a substantial association between the availability of ICT and internet facilities and academic performance in schools (Aina 2013). Contributing to better learning outcomes and preparing students for the digital era is facilitating access to and facilitating efficient use of these resources.

The findings of the study also revealed that there is a significant relationship between class size and academic performance in schools. This implies that the number of students in a classroom can have an impact on students' educational outcomes. Multiple possible gains in academic performance have been linked to class sizes that are lower. There is a correlation between the number of students per class and the quality of education students get. This has the potential to boost students' interest, involvement, and knowledge of the material being covered in class. In addition to having a more conducive environment for learning, students in smaller classes may have more chances to participate actively in class and develop meaningful relationships with both their peers and professors (Oyeniran 2014).

Larger class sizes may provide difficulties that might lower student achievement, as seen by the substantial correlation between class size and academic performance (Oyewole & Ehinola 2014). Teachers may not have the time or resources to meet the requirements of all students in bigger classes. Because of this, students may receive less individualised attention, fewer chances to actively participate, and weaker feedback. It might be challenging for students in larger classes to get their queries addressed or to receive help in a timely manner (Yusuf et al., 2016). Consistent with the findings of Koc & Celik (2015), who found that class size affected students' emotions, achievement, administration, quality, and school budgets, we find that smaller classes had a positive effect on all of these variables. Yusuf et al., (2016) revealed that students' performance was drastically worse in large classes (23% vs. 64%) compared to smaller classes.

The correlation between class size and academic performance can be complicated by a number of factors, so it's crucial to keep this in mind. There may be differing results from various education systems, teaching techniques, and topic areas. Class size can also have an influence on academic achievement when combined with other factors including teacher quality, instructional tactics, and student characteristics (Demuyakor & Abakah 2018). Policymakers and administrators in the field of education can benefit from this finding. Especially for disciplines that call for more individualised instruction and active involvement, reducing class sizes in schools may be regarded as a way to increase academic performance. Reducing class sizes can improve student learning, but doing so may need allocating more resources, such as employing more instructors and building more classrooms.

It's crucial to remember that class size alone cannot solve all of the problems in education, even if smaller class sizes may have certain advantages. In addition to students' own efforts, the quality of teaching, instructional methodologies, and the school environment as a whole all play significant factors in students' academic achievement. This necessitates the adoption of an all-encompassing strategy that considers the many variables that affect students' learning and achievement (Oyewole & Ehinola 2014). In conclusion, the finding of a statistically significant association between class size and academic performance emphasises the potential influence of class size on students' educational results. It highlights the advantages of smaller class sizes, including better academic performance, higher levels of student involvement, and greater individual attention. However,

there are several factors that impact the correlation between class size and academic performance. As a result, policy choices about class size and its effect on student achievement should be made only when more data is gathered and other relevant factors are carefully considered.

CONCLUSION

Based on the findings from the analysis of the results, of this study, it was concluded that ICT/internet facilities and class size have been found to be parameters for students' optimum performance as well as catalyst for students performances in the field of science. Taken together, the findings highlight the importance of considering both ICT availability and class size as factors in educational settings. Providing access to ICT resources and technology-rich environments can enhance students' learning experiences and academic performance. Additionally, reducing class sizes can contribute to creating a more personalized and supportive learning environment, leading to improved student engagement and achievement.

How exactly ICT and class size affect learning results can be investigated in greater depth in future studies. Further understanding of the influence of these factors on education results may be gained by examining the interplay between ICT availability, class size, and other variables including teacher quality and instructional methodologies. In general, stakeholders in education may increase student achievement and create more conducive learning environments by recognising the importance of ICT availability and class size and using this information to shape their decisions.

Recommendations

1. Educational policymakers and administrators should prioritize the provision of adequate ICT infrastructure and internet facilities in schools. This includes ensuring access to computers, tablets, internet connectivity, and educational software. Efforts should be made to bridge the digital divide and provide equitable access to ICT resources for all students
2. Teachers should receive comprehensive training and professional development programs that focus on integrating ICT effectively into classroom instruction. This training should emphasize pedagogical strategies for utilizing technology to enhance student engagement, individualize instruction, and promote critical thinking skills. Teachers should also be trained to navigate and evaluate online resources for educational purposes.
3. Consideration should be given to reducing class sizes, particularly in subjects that require more individualized instruction and active student participation. Reducing class sizes can allow teachers to provide personalized attention, create a supportive learning environment, and foster meaningful interactions among students. Policymakers should explore strategies for managing class sizes effectively, such as hiring additional teachers and creating more classrooms
4. Further research is needed to explore the long-term effects of ICT availability and class size on student outcomes. Continuously evaluate the impact of ICT integration and class size reduction initiatives to inform future decision-making.

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