# Science Education Students' Response on Emerging Technologies in Tertiary Institutions in Akwa Ibom State, Nigeria.

**Udofia, Sabbath Etim**
seudofia2015@gmail.com

**Akpan, Anyanime O.**

**Sambo, Davis David**

[1,2]Department of Science Education, Akwa Ibom State University
[3]Akwa Ibom State College of Education Afaha Nsit, Akwa Ibom State

## Abstract

The study investigated science education students' response on emerging technologies in tertiary institutions and its influence on students' academic achievement in Akwa Ibom State, Nigeria. To guide the study, two research questions were formulated and one null hypothesis was stated for the study. A descriptive survey research design was employed for the study with a targeted population of 639 first degree and NCE 300 level science education students. Four hundred and forty seven (447) form the sample size for the study using accidental sampling technique. The instrument for data collection was Students Usage of Emerging Technology Questionnaire (SUETQ). The instrument was validated and tested for reliability using Cronbach Alpha reliability estimate which yield a reliability coefficient of 0.77. The instrument was administered to the selected students in their class settings program by program by the researchers. All rated items from the subject where retrieved for data collection. Data generated from the study where analyzed using mean, standard deviation, and independent t-test statistics. The results revealed that science education students where conversant with emerging digital technologies except tracking of lost items, cyber security and quantum computation in problem solving. There was statistical significant difference in the mean response scores of male and female science education students. Based on the findings it was recommended among others that science education students whether first degree or NCE be exposed to cyber security, tracking processes and quantum computation in science problem solving.
**Keywords**: Emerging Technologies, Artificial Intelligent and Academic Achievement

## Introduction

In the last two decades, different technologies have become more available and accessible for teachers and students. This new digital tools and resources have been developed to support teaching and learning. Consequently, government initiative and training programs around the world have presented to facilitate introduction of technology in education and to encourage the process of digitalization in schools (Lifelong learning Strategy in Estonia 2020, the School Reform in Italy 2015). Akpan, Atim and Umoh (2022) opined that for the students to take advantage of technology, and for our educational system to remain relevant in this digital world the teachers, have to play a key role not just as imparters of knowledge, but also as facilitators be aware of the innovative technological skills demanded by the changes in the learning needs of the students. Thokozani, Sylvia, and Moses (2019) stated that the digital world is increasingly penetrating the education space, with digital technology gradually being used as a vehicle to deliver educational knowledge and skills in new and innovative ways. The need for students' development in using digital resources as a means to bridge the knowledge gab learning is to be emphasized in these modern times. Similarly, technology and innovation have brought tremendous change in the way the students learn; with a global network, newer avenues are created. According to Eady and Lockyer (2013), students use digital resources for a variety of purposes and in many ways, include accessing different information, personal leaning among other. Nathan, Abasi and Isuaiko (2025) also opines that

the involvement of artificial intelligence as a digital resource in research activities marks a transformative era for data collection. By exploring strategic steps to enhance data acquisition processes, students/researchers can leverage AI's potential to unlock new possibilities, address existing limitations, and contribute to the advancement of knowledge across various disciplines.

Despite, the availability of hardware and software for education, the use of digital tools in the teaching learning process, as well as digital competence in general is still uneven among students. The use of these digital tools in teaching/learning process, as well as digital competence in general, is still uneven among student. The consistent poor performance in ICT related courses raise a lot of concern on what will have been the factors militating against the use of technology education. Prominent among these challenges are lack of qualified professional ICT teachers, non-use of appropriate instructional strategy, large class size, limited programs for updating teachers knowledge , overcrowded classroom, students negative attitude, undue emphasis on the coverage of course outline at the expense of meaning learning, inadequate ICT tools and resources in our schools to mention but a few. This catalogue of challenges neither `does not create conducive. Environment ICT related courses to thrive in this country. In order for STEM to take its firm root in our society, the poor state of Science, Technology, Engineering and Mathematics must be addressed. The international computer and information literacy study (2018) documented that less than 50% of teachers used technologies in their teaching (Fraillon 2019).The results of the 2018 OECD Teaching and learning international survey revealed that teachers reported a high need of training for technology-related skills and that only 43% of teachers felt prepared to use technology in teaching (OECD 2019)

Most studies have revealed multiple factors interplaying at different levels, such as educational systems, schools, teachers (Akpan, Akpan & Umoh, 2023; Nathan, Abasi & Isuaiko, 2025). These also includes, self-beliefs level, the availability  of and access to digital tools (e.g.; school infrastructure, computers for instruction, and internet access , and the quality of the digital infrastructure are necessary prerequisite, but they are not sufficient conditions alone to lead teachers and student towards using technology in their classrooms (Okeke, Iwara, Archibong 2020). Other is attitudes, motivations and perceived self –efficacy, skills and attitudes in technology (Bingimlas 2009). In a contemporary reality, learning also takes place using digital devices, connected to wireless communication networks, sensors, and geo location mechanisms, allowing forming virtual networks between people, object, and situations. Against this background, making use of technology for teaching and learning and extending it to informal and non-formal environments implies having the necessary skills and being digitally fluent. Given this reality, digital competence has gained a strong prominence in the educational context in recent times (Tejada & Pozos, 2018). The use of technology has become an everyday occurrence; on the other hand, because the professional development of many citizens depends largely and increasingly on an efficient and appropriate use of ICT.

In this regard, Cabero (2020) opined that digital competence is one of the key competencies that Nigerian citizens generally and teachers specifically must master in the society of the future. In fact, in Spain the recent National Plan of Digital Competencies (MINECO, 2021) identifies the acquisition of Teacher Digital Competencies (TDC) at all educational levels, including the University as one of its main strategic axes, which is aimed at promoting sustainable and inclusive economic growth. The teacher is a key in such process of integrating technologies and plays a crucial role in the adoption and implementation of technologies in classroom, since the

transformation and improvement of education depend on the teachers. Therefore it implies that teachers must have effective digital competencies that allow them to integrate and use technologies in a pedagogical way.

European Union defines digital competence as; the safe, critical and reportable use of and interaction with digital technologies for learning, at work and for participating in the society and cyber security related skills, intellectual property issues, problem solving and crucial thinking (Council of the European Union 2018) the use of emerging technologies, educational portals, social media in instruction, research and communication with student s, colleagues and peers has become central in the provision of education in many parts of the world. The use of technology in education has progressed from print to the web/ internet and has become the strategy agent for empowerment and transformation. The uptake of technology in teaching and learning skill has some obstacles in Nigeria and other developing countries of the world. Modern technologies have become a broad-based knowledge for the emerging learning society. The pervasive use of emerging technologies has resulted in mass instruction through Open and Distance learning (ODL), Open Education Resources (OER) and Massive Open Online Course (MOOC) - a situation in which a web-based course of study is made available without charge to unlimited numbers of learners. The disruption has led to what is labeled as the inevitability of instability which leads to continuous transformation of the learning landscape world-wide. The use of emerging technologies in all levels of education implies that teaching and learning will continue to be redefined, learners will take increasing control of their learning and the curriculum must change from what we know it to be.

New technology now allow us to understand the varied background goals, and learning styles of our students so as to provide instructional material customized to their unique needs. It has become possible to deliver instruction to learners via on demand platforms that allowed them to study whenever, wherever, and whatever they desired, instead of requiring them to conform to the time- table schedule of today's educational model. Today, the economies of scale available from digital delivery is allowing us to radically lower the price of our educational resources, create opportunities for learners previously excluded from finely manicured quads, a wealth of talented individual with valuable contributions to make who just didn't fit into the rigid strait jackets of our old model.

## Purpose of the Study

The main purpose of this study is to investigate on science education students' response on emerging technologies in tertiary institutions in Akwa Ibom State. Specifically, the study sought to:

1. Determine the mean rating response of first degree and NCE science education students' on emerging digital technologies in tertiary institutions in Akwa Ibom State.
2. Ascertain the difference in the mean rating response of male and female first degree and NCE science education students' on emerging digital technology.

## Research Questions

1. To what extent are first degree and NCE science education students' response on emerging digital technologies in tertiary institutions in Akwa Ibom State?
2. What differences exist between the mean rating response of male and female first degree and NCE science education students' on emerging digital technology in tertiary institutions in Akwa Ibom State?

## Hypothesis

1. There is no significant difference between the mean rating response of male and female first degree and NCE science education students' on emerging digital technology in tertiary institutions in Akwa Ibom State.

## Methods

The study employed survey research design. This is concern with the mode of gathering raw fact or data for the study (Carmen, 2013). This design has proven to be one of the most effective and quantitative method of collecting information and analysis of data. The population of this study consisted of 639 first degree and NCE 300 level science education students. Four hundred and forty seven (447) form the sample size for the study using accidental sampling technique. A structured questionnaire titled Students Usage of Emerging Technology Questionnaire (SUETQ) was used for data collection. The questionnaire was validated by experts in test and measurements and two lecturers in the Department of Science Education who made some necessary corrections as well as approved it to be used for the study. The researchers adopted Cronbach Alpha reliability method to determine the reliability of the instrument which yielded a reliability index of 0.77. The instrument consisted of two parts: Part A consisted of demographic information of the science education students, Part B find out rating response of first degree and NCE science education students on emerging digital technology in tertiary institutions in Akwa Ibom State. The questionnaire was designed in a four point likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The instrument was administered to selected students in the School of Science College of Education, Afaha Nsit, and Department of Science Education, Akwa Ibom State University Ikot Akpaden, Mkpat Enin LGA of Akwa Ibom State. All rated items from the subject were retrieved for data collation. Data generated from the study were analyzed using mean, standard deviation and independent t-test statistics.

## Results

### Research Questions

To what extent are first degree and NCE science education students' response on emerging digital technologies in tertiary institutions in Akwa Ibom State?

**Table 1:** **Mean Rating Responses of First Degree and NCE Science Education Students on Emerging Digital Technology in Akwa Ibom State.**

| S/N | ITEM | X | SD |
|---|---|---|---|
| 1 | I am conversant with Artificial Intelligent (AI) | 3.11 | .737 |
| 2 | I use Artificial Intelligent to carry out my assignment | 3.78 | .413 |
| 3 | Artificial Intelligent help me to discuss difficult concept in my subject area | 4.00 | .000 |
| 4 | Artificial intelligent help me to have good explanation of some difficult concept in my subject area | 4.00 | .000 |
| 5 | I have an improve grade in my subject because I utilized Artificial Intelligent after lectures | 3.78 | .414 |
| 6 | I am able to communicate in other institutions because of the availability of internet in our schools. | 3.33 | .847 |
| 7 | When studying with peers through internet I have a fare understanding of every concept learnt. | 3.01 | 1.108 |
| 8 | Some difficulty concepts in my subject area are now things of the past because of the interaction with friends in other schools through interest. | 3.57 | 1.580 |
| 9 | Internet facilities enhances zoom lectures | 4.00 | .000 |
| 10 | All my school credentials can now be preserved in the cloud because of internet facility. | 3.60 | 1.480 |
| 11 | I can now pay my fees and sundry fees through inter-facility in the school. | 3.50 | .742 |
| 12 | I checked my semesters result online through my phone | 3.98 | .124 |
| 13 | I can stay at the comfort of my house to have online lectures | 2.66 | 1.153 |
| 14 | I can stay at the comfort of my home and submit assignment to lecturers | 1.37 | .569 |
| 15 | Science was difficult because of mathematics involvement, but now I can use quantum computation to solve such at ease | 1.85 | 1.159 |

| 16 | A step by step understanding of mathematical solution in science is made easy using Quantum computation. | 4.00 | .000 |
|----|----------------------------------------------------------------------------------------------------------|------|------|
| 17 | I am conversant with cyber-crime and hence guided against it. | 2.43 | .676 |
| 18 | My internet gadget is protected from all form of cyber-crime. | 2.34 | .661 |
| 19 | I can use my phone to track any of the missing item at ease | 1.20 | .926 |
| 20 | Because of my knowledge of cyber security all my assignment lesson are kept without being tempered with by other student. | 1.90 | .936 |

Table 1 revealed the rating responses of First degree and NCE science education students on emerging digital technology in tertiary institutions in Akwa Ibom State. From the table, science education students irrespective whether First degree or NCE responded positively on items 1,2,3.4,5,6,7.8,9,10,11,12, 13 and 16 dealing with the global digital technologies which focuses on the utilization of Artificial intelligent (AI), with respect to using AI to carry out assignment, solve difficult concept, good knowledge on how to explain difficult concept in science, improve communication skills and achievement scores in examinations was high. Conversely the mean responses on items 15, 17, 18, 19 and 20 falls below the average mean of 2.50. This implies that the students were not very conversant on those items as listed in the questionnaire, such as quantum computation in scientific mathematics problems and cyber security crime. At the same time science education students lack the knowledge of tracking of lost items.

**Research Question 2.**

What differences exist between the mean rating response of male and female first degree and NCE science education students' on emerging digital technology in tertiary institutions in Akwa Ibom State?

**Table 2**: Mean and standard deviation of gender difference of science education students' responses on emerging digital technology in tertiary institutions in Akwa Ibom State.

| Gender | N | X | SD | Mean Difference |
|--------|-----|-------|-------|-----------------|
| Male | 227 | 48.70 | 19.40 | 3.10 |
| Female | 220 | 45.60 | 22.02 | |

Table 2 revealed the mean and standard deviation of both First degree and NCE science education students. The mean and standard deviation of 48.70 and 19.40 for male yielded slightly higher mean than the female with mean and standard deviation of 45.60 and 22.02 respectively. Comparing the mean responses for the male and female students, it indicates that the male students had a higher mean response than their female counterparts. However the slight differences in the mean of male students indicated that male students seem to utilize global digital technologies more than female.

**Hypothesis:** There is no significant difference between the mean rating response of male and female first degree and NCE science education students' on emerging digital technology in tertiary institutions in Akwa Ibom State.

**Table 3**: Independent t-test analysis between male and female students on emerging digital technology

| Variable | N | X | SD | df | t-cal | t-cit | decision |
|----------|-----|-------|-------|-----|-------|-------|----------|
| Male | 227 | 48.70 | 19.40 | 445 | 2.79* | 1.96 | S |
| Female | 220 | 45.60 | 22.02 | | | | |

*significant @ 0.05 level of significance

In Table 3, the calculated t-value for the main effect of gender at df = 445 was 2.79 while the critical t-value was 1.96. This significant level is less than 0.05 in which the decision is based, indicating that the main effect of gender on emerging digital technology was statistically significant. With this observation, the null hypothesis was rejected.

## Discussion of Findings

The result in table 1 shows the rating responses of First degree and NCE science education students on emerging digital technology in Akwa Ibom State. The findings revealed that students response bordering on AI and internet were positive and high indicating that first degree and NCE students actually make use of the items in their daily activities in their schools. This is a very good development and a serious departure from the findings of Udofia and Sambo (2019) on student's satisfaction on 14.0 technologies which reported students' poor utilization of 14.0 technologies in tertiary institutions in Akwa Ibom State tertiary institutions. This may not be unconnected with the fact that from 2020, the advent of COVID 19 actually turns things around. Every person including the students were moving fast toward online learning which the researchers perceived may be the cause of present findings in the study. Conversely it is interesting to note that there are some new technologies that are not utilized by the students such as utilization of quantum computation in their learning processes as well as cyber security. Students are not aware that their work is not secured. This is in line with Charles (2012) who examined factors influencing the integration of ICT into teaching and lesson delivery.

Sequel to the results obtained with regards to the main effect of gender on students responses on emerging technology, the findings shows that there was a statistical difference between male and female students. This result came across as a plus for the male students. Therefore the null hypothesis which stated: There is no significant difference between First degree and NCE science education students rating responses on emerging digital technology in tertiary institution in Akwa Ibom State by gender was rejected.

## Conclusion

Based on the findings of this study, tertiary education students both first degree and NCE have a good knowledge of the global digital technologies. But however they are yet to utilize to a greater extent quantum computation in solving mathematical problems in sciences, tracking of lost items and knowledge of cyber security.

## Recommendations

Cyber security and tracking processes should be in the curriculum and taught to help check insecurity.

## References

Akpan, O. A, Atim, A. I. & Umoh, E. B. (2022). Integration of digital technologies in stem teaching and learning in universities in Akwa Ibom State. *Proceedings of the 36th Annual congress of The Nigerian Academy of Education held at the University of Calabar, Calabar, Cross River State*. 162-177.

Bingimas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science and technology Education*, 5(3), 235-245. https://doi.org/10.12973/ejmste/75275

Cabero, J. (2021). Digital competences of educators in health sciences: their relationship with some variables. *Education Medical*, 22(2), 94-98. https://doi.org/10.1016/j.edumd.2020.11.014.

Carmen, A. (2013). Introduction to the research methodology and role of stakeholders. 10.10007/978-3-642-30529-0_5.

Eady, A. & Lockyer, M. (2013). Preparation and professional development of teacher educators in tanzania: current practices and prospects. *Journal of Education and Practice*, 8(8) 136-145

Fraillon, J. Ainley, J. Schulz, W. Duckworth, D. & Friedman, T. (2019). *IEA international computer and information literacy study 2018 assessment framework*. Springer Nature. https://doi.org/10.1007/978-3-030-19389-8.

Nathan, N. A., Abasi, A. U. & Isuaiko, O. (2025). Artificial intelligence involvement in research activities: exploring its enhancement in researches carried out by post graduate students in Akwa Ibom State Tertiary Institutions. *GASPRO International Journal of Eminent Scholars*, 12 (1), 1-13.

OECD, (2019). TALIS 2018 results (volume 1): *Teachers and school leaders as lifelong learners*. OECD Publishing. https://doi.org/10.1787/idobc92a-en.

Okeke, S. U. Iwara, H.B. & Archibong H. E. (2020). Problems of curriculum implementation in Nigeria. Global *Journal of Academic Research Forum*, 8(1), 34-50.

Tejada, J & Pozos, K. (2018). Nuevosescenarios y competenciasdigitalesdocentes: Hacia la profesionalizaciondocentecon TIC. *Profesorado De Curriculum y Formacion Del Profesorado*, 22(1), 25-51

Thokozani, E. Sylvia, T. & Moses O. (2019). Digital teaching competence of university teachers: A systematic review of the literature. *IEEE Revistalberoamericana De Technologias Del Aprendizalje*, 15(4), 399-406. https://doi.org/10.1109/RITA.2020.3033225

Udofia, S. E. & Sambo, D. D. (2022). Extent of use of digitalized teaching strategy in stem pre-service teachers' preparation for sustainable national development. *Proceedings of the 36th Annual congress of The Nigerian Academy of Education held at the University of Calabar, Calabar, Cross River State*. 191-202.