Vol. 11 No. 1 June, 2023 ISSN: 0794-9525

Impact of Integrating ICT into Mathematics Instruction in Nnamdi Azikiwe University in the Period of Socio–Political and Economic uncertainty in Nigeria.

Okigbo, Ebele. Chinelo, Onyeka, Edith Chinyere, Ekoyo, Destiny Onyebuchi, Okoye, Grace Nwakaego &Okonkwo,Okwuchukwu Kenechukwu.
Department of Science Education, Faculty of Education,
Nnamdi Azikiwe University Awka, Anambra State. Nigeria.
Email: ech.onyeka@unizik.edu.ng

Abstract

The study investigated the impact of integrating ICT into Mathematics Instruction in Nnamdi Azikiwe University (NAU) during the period of Socio–Political and economic uncertainty in Nigeria. Descriptive survey research design was adopted and two research questions guided the study. The population comprised all mathematics students from the Science Education Department and Faculty of Physical Sciences in NAU. The sample random sampling technique was used to select 101 students for the study. Instrument titled Impact of Information and Communication Technology into Mathematics Instruction Questionnaire, IICTIMQ, developed by the researchers was used for data collection. The instrument was validated by three experts and the reliability index of 0.76 was obtained, using Cronbach alpha method. Data were collected through direct delivery method using three research assistants. Mean and standard deviation were used to answer the research questions. The findings showed that integrating ICT into Mathematics instruction in NAU during the period of Socio–Political and economic uncertainty in Nigeria has positive impact. Also, interactive whiteboards, incorporating multimedia resources and interactive activities, mathematics software, Video Tutorials and Online Resources, collaborative learning tools, Online Interactive Graphing Tools, group WhatsApp platforms, and Online Adaptive Teaching/Learning Platforms are the effective elements of ICT integration used for Mathematics instruction. It was recommended among others that integrating ICT into Mathematics instruction in NAU this period of Socio–Political and economic uncertainty in Nigeria should be encouraged among students and Lecturers since it is impactful in learning mathematics.

Keywords: ICT integration, Mathematics instruction, University, Students.

INTRODUCTION

Information and Communication Technology (ICT) as an umbrella term that includes a communicative device for teaching and learning (Bolaji and Onikoyi, 2023, Bolaji and Jimoh, 2023). They saw ICT as an essential tool to be part of any education reform efforts to scale innovations and provide educational services that might digital changing global needs. International Institute for Educational Planning (IIEP, 2023), also, opines that ICT can impact student learning when teachers are digitally literate and understand how to integrate it into their teaching. ICT is necessary in the period Socio-political and economic uncertainties. Socio-political uncertainty includes a combination of social and political issues and Nigeria has

experienced various Socio-political and economic uncertainties. Some major occurrences that affected the country include, insecurity and insurgency.

Nigeria has grappled with security challenges, particularly activities of insurgent groups like Boko Haram in the Northeast region and banditry in other parts of the country. These issues led to the displacement of communities, loss of lives, and economic disruption (Rafiah, Nathan, Yasmine, Mohanad, Amr-Hamzawy, Marwan-Ülgen, & Maha-Yahya, 2023). Protests and Civil Unrest, in October 2020, the End SARS protests calling for an end to police brutality and demanding police reforms gained significant momentum and continued into 2021. The protests were met with varying degrees of response from the government, leading to further civil unrest. It also refers to a state of instability, unpredictability, and ambiguity regarding social and political factors that can impact individuals, communities, and society as a whole. It arises from factors such as political instability, social unrest, changes in government policies, geopolitical tensions, shifts in public opinion, and cultural conflicts. Resulting to various aspects of society, including governance, social cohesion, economic development, human rights, and individual freedoms. It can create challenges and obstacles for decision-makers, businesses, institutions, and individuals in planning, policy-making, and day-to-day life, often leading to a sense of unease and caution (Manoel, Rangan, Philton, & Lardo, 2018) and (Xue, Rui, Mason. & Joseph, 2020).

Socio-political and economic uncertainty could have several impacts on the teaching and learning of mathematics in universities. Economic uncertainty can lead to budget constraints, reducing the availability of resources for mathematics education. This can restrict access to technology, textbooks, and other essential materials, affecting the quality of instruction and learning outcomes. It may also, result in reduced funding and opportunities for mathematical research projects. This can affect the overall innovation and advancement of mathematical knowledge within the university. Socio-political uncertainty can lead to changes in government policies and educational priorities, which may impact the curriculum design and content of mathematics courses, security challenges and disruption of academic sessions. The focus of mathematics might be redirected to address immediate societal needs or political agendas, potentially altering the traditional mathematical curriculum. This can disrupt academic activities, including mathematics education instructions, and impact the continuity and quality of education. It could also hamper student motivation and well-being. It can create an atmosphere of anxiety, fear, and stress among students. These factors may lead to decreased engagement and performance in mathematics education courses. In economically uncertain times, talented mathematics faculty and students may seek better opportunities abroad or in other sectors, leading to a brain drain. This can result in a loss of expertise and reduced academic capacity within mathematics.

Kohnert (2023), reported that presidential elections were held in Nigeria on 25 February 2023. The elongated court tussle to validate the result of the polls created socio-political and economic uncertainty in the nation of Nigeria. Other crisis in the country includes insecurity, fuel shortage, shortage of new banknotes, removal of oil subsidies, and increase in dollar per naira. As reported by Ogbolu (2023) , the exchange rate for a dollar to naira at Lagos Parallel Market (Black Market) players buy a dollar for N1140 and sell at N1150 on Saturday 28 October 2023. In the words of Kohnert (2023), insecurity, fuel shortages, and a shortage of new banknotes raised difficult times in Nigeria. Integrating Information and Communication Technology into Mathematics Instruction in university could be a way out of these problems.

Statement of the Problem

It has been observed by the researchers that the struggle of mathematics educators to inflate mathematical mastery vintages (yields) negligible success in our schools. A growing frame of indication revealed that outmoded instructions still lead the education packages and are skewed with the assorted education prospects presented by the use of ICT. The inability of mathematics educators to imbibe integrating ICT in teaching and learning of Mathematics might have led to poor learning outcomes in university mathematics. This study queries how the integration of ICT in Mathematics Instruction influence teaching and learning in the face of socio-political and economic uncertainty. Hence, this study sought to investigate the impact of integrating ICT into teaching and learning of Mathematics in the NAU during the period of Socio–Political and economic uncertainty in Nigeria**.**

Purpose of the Study

The purpose was to investigate the impact of integrating ICT into Mathematics instruction in NAU in the period of Socio–Political and Economic Uncertainty in Nigeria. Specifically, it investigated;

5. impact of integrating ICT in teaching and learning of Mathematics in Nnamdi Azikiwe University, Awka,
6. effective elements of integrating ICT in teaching Mathematics in the period of Socio–Political and economic uncertainty.

Research Questions

5. How impactful is integrating ICT in teaching and learning of Mathematics in NAU, Awka?
6. What are the effective elements of ICT integration in teaching Mathematics in a period of Socio–Political and economic uncertainty?

Method

The study used a descriptive survey research design. The study was carried out in Nnamdi Azikiwe University (NAU) Awka, Anambra State, Nigeria. The study population comprised all mathematics students from the Science Education Department and Faculty of Physical Sciences in NAU Awka. A sample random sampling technique was used to select 132 students for the study. At the end, 101copies of the questionnaires were returned out of 132 copies distributed. A questionnaire titled Impact of ICT Integration into Teaching and Learning of Mathematics questionnaire was developed by the researchers. The instrument comprised 20 items with four response options of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) with ratings of 4, 3, 2, and 1, respectively. With the help of two (2) mathematics educators from the Department of Science Education and one (1) measurement and evaluation lecturer from the Department of Educational Foundations, all from NAU the instrument was validated. To establish the reliability of the instrument, copies of the questionnaire were distributed to 20 mathematics students from the Science Education Department and Faculty of Physical Sciences in Chukwumeka Odumegwu Ojukwu University, Anambra State. The Cronbach Alpha technique was used to assess the data that was gathered from the administered questionnaire. The instrument's reliability was found to be 0.76, indicating that it is quite reliable.

The researchers administered the validated questionnaire with of three research assistants to randomly selected 132 respondents of mathematics students from the Science Education Department and Faculty of Physical Sciences in NAU In the end, 101 copies of the questionnaires were returned and completely filled which were used for analysis. The data collected were analyzed, using the mean and standard deviation were used to answer the research questions A cut of point of 2.50 was used as a basis for decision making meaning that, any mean item with a mean score of 2.50 and above indicated agreement with the statement while any mean score of below 2.50 indicated disagreement.

In making decision, a range of values such as follows was used

1.00 – 1.49	Strongly Disagree (SD)
1.50 – 2.49	Disagree (D)
2.50 – 3.49	Agree (A)
3.50 – 4.00	Strongly Agree (SA)

RESULTS

Table 1: Impact of integrating ICT into Mathematics Instruction in NAU (N =101)

S/N	Items	N	Mean	SD	Decision
1	The use of ICT in teaching and learning Mathematics has contributed to my engagement during this period of Socio-Political and Economic Uncertainty.	101	3.27	0.81	Agree
2	ICT has proven effective in enhancing my learning of Mathematics.	101	3.19	0.97	Agree
3	There have been positive changes in my performance in Mathematics since the integration of ICT.	101	2.61	1.05	Agree
4	I have received adequate professional development training opportunities to effectively utilize ICT for learning Mathematics.	101	2.75	0.91	Agree
5	ICT-based activities and learning experiences have been most successful in helping me to grasp complex Mathematics topics.	101	3.07	0.83	Agree
6	In my experience, I observed key benefits of integrating ICT in teaching and learning of Mathematics.	101	3.29	0.70	Agree
7	I have noticed many improvements in my understanding and mastery of Mathematics concepts since the integration of ICT.	101	2.84	0.91	Agree
8	I have faced many challenges and limitations in effectively integrating ICT in teaching and learning Mathematics.	101	3.10	1.00	Agree
9	I have faced many challenges and limitations in effectively integrating ICT in teaching and learning of Mathematics and that stalled my progress in the process.	101	3.08	0.83	Agree
10	Having overcome most of the challenges and limitations in effectively integrating ICT in teaching Mathematics during times of socio-political and economic uncertainty, am now enjoying seeming less teaching and learning of mathematics using ICT supported facilities.	101	3.06	1.03	Agree
	Total	101	3.03	0.90	Agree

Vol. 11 No. 1 June, 2023 ISSN: 0794-9525

From, Table 1 students are in agreement to the fact that the use of ICT in teaching and learning Mathematics has contributed to their engagement, proven effective in enhancing my learning of Mathematics, there are positive changes in their performance in Mathematics since the integration of ICT, received adequate professional development training opportunities to effectively utilize ICT for learning Mathematics, ICT-based activities and learning experiences have been most successful in helping them to grasp complex Mathematics topics, in their experiences, they observed key benefits of integrating ICT in teaching and learning of Mathematics, they have noticed many improvements in their understanding and mastery of Mathematics concepts since the integration of ICT they have faced many challenges and limitations in effectively integrating ICT in teaching and learning of Mathematics during the era of Socio-Political and Economic Uncertainty and that stalled my progress in the process, having overcome most of the challenges and limitations in effectively integrating ICT in teaching Mathematics during times of socio-political and economic uncertainty, they now enjoying seeming less teaching and learning of mathematics using ICT supported facilities with each mean rating from 2.61 to 3.29 and overall mean of 3.03 which are above the mean scores benchmark which was set for this study at 2.50. This study demonstrated that integrating ICT in teaching and learning Mathematics in NAU during the period of Socio–Political and economic uncertainty in Nigeria had positive impacts.

Table 2: Effective elements of ICT integration in teaching Mathematics in a period of Socio–Political and Economic Uncertainty.

S/N	ITEMS	N	MEAN	SD	DECISION
11	My teachers are using interactive whiteboards to teach mathematics in the period of Socio – Political and Economic Uncertainty.	101	3.09	0.93	Agree
12	Incorporating multimedia resources and interactive activities help to engage students in a dynamic mathematics learning experience.	101	3.10	0.98	Agree
13	I use virtual manipulative as interactive digital tools in learning mathematical concepts.	101	2.75	0.98	Agree
14	I use mathematics software, such as graphing calculators and statistical analysis tools for mathematics learning.	101	3.30	0.93	Agree
15	Our lecturers use Video Tutorials and Online Resources in learning mathematics.	101	3.26	0.92	Agree
16	Our lecturers use collaborative learning facilitates group work and allow for effective peer learning in Mathematics.	101	3.03	1.06	Agree
17	The lecturers use Online Interactive Graphing Tools.	101	2.96	1.07	Agree
18	The lecturers use group WhatsApp platform which provides opportunities for easy learning of Mathematics.	101	3.46	0.78	Agree
19	My lecturers use google meet in mathematics teaching and learning	101	3.18	1.03	Agree
20	Online Adaptive Teaching/Learning Platforms are used for Mathematics instruction in the University.	101	3.24	0.96	Agree
	TOTAL	101	3.14	0.96	

Table 2 shows that the respondents agreed that, their lecturers are using interactive whiteboards, incorporating multimedia resources and interactive activities, virtual manipulative as interactive digital tools, and provide hands-on approach to learning mathematical and science concepts, mathematics software, such as graphing calculators and statistical analysis tools, Video Tutorials and Online Resources, instructional videos, and resources, such as virtual whiteboards,

online forums, and collaborative document editing platforms, Online Interactive Graphing Tools and manipulate graphs, group WhatsApp, google meet, Online Adaptive Teaching/Learning Platforms to learn Mathematics in the period of Socio – Political and Economic Uncertainty. With mean ratings of 2.75, to 3.46 which are above the mean benchmark of 2.50 set for this study. This study established that, interactive whiteboards, incorporating multimedia resources and interactive activities mathematics software, Video Tutorials and Online Resources, collaborative learning tools, Online Interactive Graphing Tools, group WhatsApp platform, Online Adaptive Teaching/Learning Platforms are the effective elements of ICT integration used in teaching and learning of Mathematics in the period of Socio – Political and Economic Uncertainty.

DISCUSSION:

Findings from the results (Table 1) revealed that integrating ICT into teaching and learning of Mathematics in Nnamdi Azikiwe University during the period of Socio–Political and economic uncertainty in Nigeria had positive impacts. The findings gave credibility to the findings of Akpan et al (2023) that, students taught quadratic graph using technology enhanced learning tool (SymboLab Manipulative) performed significantly higher than those taught using Concrete Manipulative. Ghavifekr and Rosdy (2015)'s results indicated that, ICT integration has a great effectiveness for both teachers and students teaching and learning respectively.

In contrast, Amedu and Hollebrands (2022)'s results showed that both teachers found teaching mathematics online more difficult compared to classroom-based instruction, showing that integrating ICT in teaching and learning Mathematics was not impactful.

Findings from Table 2 established that, interactive whiteboards, incorporating multimedia resources and interactive activities mathematics software, Video Tutorials and Online Resources, collaborative learning tools, Online Interactive Graphing Tools, group WhatsApp platform, Online Adaptive Teaching/Learning Platforms are the effective elements of ICT integration used in teaching and learn Mathematics in the period of Socio – Political and Economic Uncertainty. The findings gave credence to that of Armah and Osafo-Apeanti (2012) which established that the use of technology supported applications; graphing software (SymboLab) improves academic performance of students in plotting of quadratic functions in Mathematics. Benning and Agyei (2016) also found that the Spreadsheet Instructional Method served a useful pedagogical approach, impacted more on the students' performance and has the potential of improving teaching and learning mathematics in Senior High schools in addition.

Simin et al. (2014) findings illuminate that, most of the teachers are normal users, and frequently use ICT in teaching and learning mathematics.

Recommendations

Based on the findings of this research, the following recommendations are made:

1. Integrating ICT in teaching and learning Mathematics in the University during the period of Socio–Political and Economic Uncertainty in Nigeria should be encouraged among mathematics lecturers since it is impactful to learning mathematics.

2. There should be free training for both lecturers and students on the use of interactive basic ICT elements for teaching and learning of mathematics in NAU by the university management for effective Mathematics Instruction in the period of Socio – Political and Economic Uncertainty.

Conclusion

The study revealed that integrating ICT in teaching and learning Mathematics in NAU during the period of Socio–Political and Economic Uncertainty in Nigeria had positive impacts. The study also, established that, elements ICT such as interactive whiteboards, incorporating multimedia resources and interactive activities mathematics software, Video Tutorials and Online Resources, collaborative learning tools, Online Interactive Graphing Tools, group WhatsApp platform among others are effective when used for mathematics instruction in the period of Socio – Political and Economic Uncertainty.

References

Akpan, E. T., Charles-Ogan, G. I., Eze, F. B., Uzoamaka C. Okafor-Agbala, U. C. and Onyeka, E. C. (2023) Technology Enhanced Learning: Utilization of SymboLab Manipulative Instruction and Performance of Students in Quadratic Graphs. *Asian Journal of Advanced Research and Reports* 17(11), 32-42.

Amedu, J. & Hollebrands, K. (2022) Teachers' Perceptions of Using Technology to Teach Mathematics During COVID-19. *REDIMAT – Journal of Research in Mathematics. Remote Learning* 11 (1) 71-85.

Armah, P. H, &Osafo-Apeanti W. (2012) The effect of graphing software on students' conceptual understanding of quadratic functions. *African Journal of Educational Studies in Mathematics and Sciences.*1(3):9- 22.

Benning I. & Agyei D.D, (2016) Effect of Using Spreadsheet in Teaching Quadratic Functions on the Performance of Senior High School Students**.** I*nternational Journal of Education, Learning and Development* 4(1), 11-29.

Bolaji, H. O. & Abayomi, O. (2022) Usability of ICT for Class Size Remediation and Learning Among Secondary Schools. *Indonesian Journal of Educational Research and Technology (IJERT) 4(1). http://ejournal.upi.edu/indenPhP/IJERT:/*

Bolaji, H. O. &Jimoh, H. A.(2023) Usability and Utilization of ICT among educational administrators in secondary students in public schools. *Indonesian Journal of Educational Research and Technology (IJERT)* 3(2) 97-104.

Ghavifekr, S. & Rosdy, W.A.W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES)*, 1(2), 175-191.

International Institute for Educational Planning (IIEP) (2023) UNESCO: Information and communication technology (ICT) in education. *https://learningportal.iiep.unesco.org/en/issue-briefs/improve-learning/information-and-communication-technology-ict-in-education*

Kohnert, D. (2023). The aftermath of Nigeria's 2023 presidential elections and its impact on the sub-region. *https://mpra.ub.uni-muenchen.de/116567/*

Manoel B., Rangan G., Philton M., & Lardo S. (2018) Socio-Political Instability and Growth Dynamics. *https://ideas.repec.org/p/pre/wpaper/201855.html.*

Ogbolu, G. O. (2023) Black Market Dollar to Naira Exchange Rate Today 29th October 2023. *https://www.naijanews.com/2023/10/29/black-market-dollar-to-naira-exchange-rate-today-29th-october-2023/*

Rafiah A. T., Nathan J. B., Yasmine F., Mohanad H. A., Amr Hamzawy, Z. H., Marwan Ülgen M. S., Maha Yahya, S. Y. (2023) . Arab Perspectives on the Middle East Crisis. *https://carnegieendowment.org/2023/10/13/arab-perspectives-on-middle-east-crisis-pub-90774*

Simin G., A. Zabidi A. R., Muhammad Faizal A. G., Ng Yan Ran, Y. M. & Zhang T. (2014). ICT Integration in Education: Incorporation for Teaching & Learning Improvement. *The Malaysian Online Journal of Educational Technology* 2(2) 24 – 45.

Xue Y., Rui S, Mason MC L. and Joseph TF, L. (2020). Anticipated socio-political developments and related personal responses as structural determinants of mental health problems: A population-based study. *International Journal of Social Psychiatry*, 66(1) 58–66.