
**TEACHERS' GENDER AND EXTENT OF UTILIZATION OF CLOUD COMPUTING IN THE TEACHING
PROCESS IN PUBLIC SECONDARY SCHOOLS IN UYO LOCAL GOVERNMENT AREA**

AKPAN, E. Ebenezer, Ph.D, FCICN, AP, PPGDCA, PHDCDPM
Corporate Institute of Research and Computer Science,
140 Ikot Ekpene Road,
Uyo, Akwa Ibom State

AND

Pius K. JACK, Ph.D
Faculty of Education
Golden Gate University
536 Mission Street
San Francisco, CA 94105
California, United States of America

ABSTRACT

The study was to assess teachers' gender and extent of utilization of cloud computing in the teaching process in public secondary schools in Uyo Local Government Area. The study adopted a Expost facto design conducted in Uyo Local Government Area, Akwa Ibom State. The population of the study consisted of teachers in the public secondary schools in Akwa Ibom State. The study selected the 14 public secondary schools. Sample size of 206 was obtained using multi-stage random sampling technique consisting proportionate and simple random sampling technique. The instrument used by the researcher for the study was a questionnaire tagged " Cloud Computing in Teachers Pedagogy Questionnaire (CCTPQ). " Face and content validation of the research instrument was carried out by an expert in tests and measurement. From the analysis, the reliability coefficient 0.90 was obtained and the value was considered substantially high enough to justify the use of the instrument. The data obtained was analyzed using mean score and standard deviation for answering the research question while t-test was used in testing the hypotheses respectively. The calculated values were compared with the critical values for the test of significance of the result at 0.05 alpha level. The study concluded that awareness of the importance of cloud computing in education as well as exposes the state government and education managers and planners to the position of teachers in the utilization of cloud computing in the teaching process in schools. The study highlights the extent of teachers' utilization of cloud computing in the teaching process based on gender factors and could contribute towards the advancement of education in Akwa Ibom state. The teachers' utilization of the facilities was low. One of the recommendations made was that educational administrators should provide enabling environments within the school setting to aid the frequent use of cloud computing facilities for instruction.

KEYWORDS: Teachers' gender, cloud computing, teaching process, public secondary schools, Uyo Local Government Area

Introduction

Nigeria's yearning for socioeconomic transformation of its citizens as obtained in developed nations cannot be achieved without ensuring a functional educational system that incorporates current educational realities into the teaching and learning process. As a nation with human resources, Nigeria's education has to be effectively run to promote the ideals of education in human capacity building. This is because education in 21st century society is a springboard for the wellbeing and general development of society. That is why Oriji and Maekae (2013) observed that the implication of the quality of education at all levels has a far reaching impact on a nation's moral, cultural, and economic sustainability. In other words, education is an indispensable tool that does not only assist in meeting the nation's social, political, moral, cultural, and economic aspirations but will ultimately inculcate in the individual knowledge, skills, dexterity, character, and desirable values that will foster national development and self-actualization. However, the importance of education motivated Nigeria's quest for the establishment of educational institutions (schools), the formation of curricula, and the establishment of stringent policies to guide the sector. The establishment of schools was primarily to create an environment for teaching and learning with the prominent aim of inculcating a viable education in the learners for maximum social, economic, and general development. It is when teaching and learning are effective that learners can be standardized as having developed optimum capacity. Teaching and learning can be effective in 21st century societies like Nigeria when the 21st century realities of technology utilization are incorporated into the teaching and learning process of education to ensure it facilitates social and economic development.

Basically, technology has become an essential tool for educators to ensure that the teaching and learning process are more interesting and effective. An example of such profitable technology that can facilitate easy accessibility and comprehensibility of educational resources is cloud computing. Cloud computing is considered a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (examples are network servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service-provider interaction (National Institute of Standards and Technology, NIST, 2011). This educational cloud involves all the learning students carry out on mobile phones, smart phones, tablets, palmtops, laptops, and personal computers while connected with Wi-Fi. It may include download of materials for assignments and research, studying online and other individualized learning done via connectivity to the wireless cloud within a campus or elsewhere.

Statement of the Problem

The importance of computer technology cannot be overemphasized. Several research studies have advocated that technology helps students and teachers streamline learning (Effiong, 2013). These values of technology can spur and stimulate efficiency in teachers

and students and, in turn, improve teaching service delivery and learning effectiveness. Despite the acclaimed effectiveness and potency of technology in cloud computing, issues relating to instruction transfer remain one of the core impediments to educational development in Nigeria generally (Mathew, 2015). This issue may not be unconnected with the understanding of the usefulness of technology.

Objective of the Study

The main purpose of the study was to investigate the position of teachers on cloud computing as necessary tool for enhancing teachers' pedagogy in public secondary schools in Uyo Local Government Area.

1. Investigate the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools.
2. Examine the difference in the utilization of cloud computing between male and female teachers in public secondary schools.

Research Questions

The following research questions were raised to guide the study:

1. What is the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools?
2. What is the difference in the utilization of cloud computing between male and female teachers in public secondary schools?

Research Hypotheses

The following null hypotheses were formulated to guide the study and were tested at 0.05 level of significance.

HO₁: The extent of teachers' utilization of cloud computing in the teaching process in public's secondary schools is not significant.

HO₂: There is no significant difference in the extent of utilization of cloud computing between male and female teachers in public secondary schools.

Conceptual review

Concept of cloud computing

The importance of computer technology cannot be overemphasized. Several studies have claimed that cloud computing aids students and teachers in streamlining teaching and learning, facilitating effective instruction transfer, and improving collaborative learning (Effiong, 2013). Cloud computing is a computing paradigm where a large pool of systems are connected together in private or public networks to provide a dynamically

scalable infrastructure for applications, data, and file storage. With the advent of this technology, the cost of computation, application hosting, content storage, and delivery has been reduced significantly. Cloud computing is a practical approach to experiencing direct cost benefits, and it has the potential to transform a data center from a capital-intensive set up to a variable priced environment (Alhabri & Sonawane, 2061). The idea of cloud computing is based on a very fundamental principle of reusability of IT capabilities. The goal of distributed computing, utility computing, and autonomic computing is to expand horizons across organizational boundaries. Different authors, organizations, and technologists have tried to define cloud computing in various ways. In a nutshell, cloud computing and technologists have tried to define cloud computing as services such as data storage, software applications, and so forth, that are accessed over the internet. The National Institute of Standards and Technology (NIST) provided us with the formal definition of cloud computing and that is "cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service-provider interaction" (National Institute of Standards and Technology, 2011).

Extent of Teachers' Utilization of Cloud Computing in the Teaching Process in Public's Secondary Schools is not Significant.

According to Etro (2009), the utilization of cloud computing in the teaching process is enormous. Cloud computing allows users to have access to data, applications, and services anywhere. The author opined that by moving ICT infrastructure and software applications to the cloud, SMEs can utilize resources in a more efficient and effective manner, thus giving them business focus. Subscribing cloud users with the ability to pay for cloud resources when needed and the ability to scale up or scale down resources as per demand (Kourik, 2011). This is made possible by having a large pool of virtualized servers in the cloud. Moreover, investment and cloud computing can improve SME's competitive advantage (Cash and Konsynski, 1985).

Furthermore, one of the key advantages of cloud computing is accessibility (Dai, 2009). Cloud computing consists of cloud services that are accessible via the internet. Such models give SMEs the mobility to access cloud services from any location. Interview findings revealed that most SMEs perceive cloud computing as a cost-effective solution that can be easily implemented and accessed anywhere, as some participants made this comment when asked about the benefits of cloud computing: "I would say cost reduction, availability, and accessibility as well as shifted risk." The cloud is that the services are accessible anywhere as long as there is internet connectivity. Risk is shifted from internal to a cloud provider because there is expertise available to manage such risks better than internal ICT staff. Therefore, cloud computing is perceived to be cost effective as there are no additional costs such as software licenses, hardware, ICT infrastructure support and maintenance. Expert review findings identified cost saving, anywhere access, and quick and easy implementation as some of the benefits of cloud

computing: "The common benefits are cost savings, agility, and anywhere access." Cost saving is evident because when a company moves to the cloud, it saves on electricity, server cost, licensing cost and salaries to pay staff that support in-house ICT services". These findings are in concurrence with the questionnaire and interview findings (Mirzaei, 2009).

Furthermore, these findings indicate that there is a lot that SMEs can benefit from by moving their ICT infrastructure to the cloud. Therefore, the benefits of cloud computing for an enterprise include:

1. Reduction in upfront capital expenditure on hardware and software deployment. Consumption is usually billed on a utility (like phone bills) or subscription (like magazines) model. Users can terminate the contract at any time and are often covered by service level agreements (SLAs) with financial penalties. This reduces risk and uncertainty and ensures ROI.
2. Location independence, as long as there is access to the internet.
3. Increased flexibility and market agility—the quick deployment model of cloud computing increases the ability to re-provision rapidly as required.
4. Allows enterprises to focus on their core business.
5. Increased competitive advantage.
6. Increased security at a much lower cost as compared to traditional standalone applications due to centralization of data and increased security-focused resources.
7. It's easy to maintain as they don't have to be installed on each user's computer.

Extent of Utilization of Cloud Computing between Male and Female Teachers in Public Secondary Schools

Gender disparity can be seen in the area of ICT. Wajcman (2006) observed that many feminists believe that western technology embodies patriarchal values. The author argued that most women are reluctant to go into technology because of the sex-stereotyped definition of technology as an activity appropriate for men. Sanda and Kufri (2013) also reiterated that despite the emphasis placed on the use of ICTs in Nigeria, women are usually underrepresented in terms of access and use of ICTs. The authors also observed that though women play a pivotal role in the development of their societies, their impact has been muted in the use of this new technology due to a lack of access and the necessary skills for the operation. Fenwick (2004) showed that gender inequity persists both in access to and experience of learning opportunities with ICT. Mahmood and Bokhari (2012) believe that gender and ICT interact in complex ways, but in the

aggregate, females are much less likely to participate in ICT courses, careers, and leadership. In past studies, authors found that using technology for learning is a dominant activity for males and that males have more positive attitudes towards using technology for learning than do females (kadijevich, 2000; Li & Kirkup, 2007). Moreover, when equal access is provided to all students, males are less likely to use a male activity. Another study found more females than males indicated that computers are useful, but females found it less enjoyable to learn to use computers than did males. Several other studies have found that women are less confident and more anxious about using technology for learning (Dhindsa & Shahrizal-Emran, 2011). In developed countries, results are equally mixed, with a technology-usage dominance reported in favour of males (Appianing & VanEck (2005), females (Zhou and Xu, 2007; Cuadrado-Garcia et al. (2010), or no difference (Milis et al., 2008; Kay, 2006).

A study conducted by Aminu et al. (2019) indicates that teachers' ICT integration in teaching is still low, though the majority of the teachers (88.76%) agree that the integration of ICT in teaching and learning activities has brought a positive impact on their students' learning ability. For Nigeria to have effective technology-based teachers at all levels, there is a need to include cloud technology training courses at the teacher's institution, so that the trainer can acquire teaching skills along with ICT skills. This was supported in a study which stated that such an approach has been found to yield better teachers' achievement in handling technological tools (Garba and Alademerin, 2014). Cloud technology use in schools depends solely on the teachers' training, interest, and full implementation of ICT. This would enhance teaching and learning, improve teacher efficacy, and develop learners' ability to use technology.

Methodology

The study was conducted in Uyo Local Government Area of Akwa Ibom State. Expost facto design was adopted for the study with the population comprising of teachers in the 14 public secondary schools in Akwa Ibom State. Sample size of 206 was obtain using multi-stage random sampling technique consisting proportionate and simple random sampling technique. The Instrument used in this study for data collection was a questionnaire titled "Cloud Computing in Teachers Pedagogy Questionnaire" (CCTPQ). Face and content validation of the instrument was carried out by an expert in test measurement and evaluation from University of Uyo to ensure that the instrument has the accuracy, appropriateness and completeness for the study. Cronbach Alpha technique was used to determine the level of reliability of the instrument. The reliability coefficient obtained was 0.90 and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to mean score and standard deviation for answering the research question while t-test was used in testing the hypothesis. The test for significance was done at 0.05 alpha levels.

Result/Discussion

Research Question 1: What is the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools?

Table 1: Mean score analysis of the extent of teachers' utilization of cloud computing in the teaching process in public schools

Items description	Mean Scores	Remarks
The extent teachers....		
Search internet for information for lessons note preparation	3.12	HE
Pass assignment to students through email or any ICT platform	1.03	VLE
Sent message on class activity to students via telecommunication	2.09	LE
Converse with students via telecommunication	2.43	LE
Taught students educational usefulness of internet platforms	2.19	LE
Utilized the cloud system in managing workload	2.04	LE
Utilized cloud system in making the class interesting	1.92	LE
Utilized cloud system to better teacher–student communication	1.72	LE
Utilized cloud system as co-curricular interaction platform with Students	2.01	LE
Utilized cloud system in storing information	3.43	HE
Total	2.20	LE

Table 1 how that the mean score of the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools in uyo Local Government Area was 2.20. This implies that the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools was low.

Research Question 2: What is the difference in the utilization of cloud computing between male and female teachers in public secondary schools?

Table 2: Mean Score of difference in the utilization of cloud computing between male and Female teachers in public secondary schools

Gender	N	Mean Score	Standard Deviation
Male	89	9.06	1.00
Female	111	9.74	1.66
Total	200	9.86	1.03

Table 2 indicates difference in the utilization of cloud computing between male and female teachers in public secondary schools in Uyo Local Government Area. The analysis reveals the mean score of 9.06 and 9.74 for male and female teachers were different. The mean score of female was greater than that of male counterparts, implying that female teachers utilized cloud computing in teaching process more than the male teachers.

Hypothesis Testing

Research Hypothesis 1: The extent of teacher's utilization of cloud computing in the teaching process in public secondary schools is not significant.

Table 3: Simple linear regression analysis for the extent of teacher's utilization of cloud computing in the teaching process in public secondary schools in Uyo local government area (N=200)

Source of Variation	sum of square	df	mean square	F-cal	sig of F	Decision @P<.05
Regression	76.997	1	76.997	.229	.301a	*
Residual	12.631	199	18.246			
Total	19.628	200				

^P>.05; N=200, df=1 & 199

Table 3 revealed the calculated F-value as .229. The result also shows that the non-significance of F-value (.229), whose corresponding probability value (p-value) is .301 is greater than .05. The result is statistically not significant and the null hypotheses is accepted. Thus, the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools in Uyo Local Government Area is not significant. The implication is that the extent of teachers' utilization of cloud computing in schools do not contributes significant in the enhancement of teaching process in public secondary schools in Uyo LGA.

Research Hypothesis 2: There is no significant difference in the extent of utilization of cloud computing between male and female teachers in public secondary schools.

Table 4: T test analysis of the difference in mean scores of extent the utilization of cloud Computing between male and female teachers in public secondary schools

Variables	N	Mean	SD	t-teal	Df	t-erit
Male	89	9.06	1.00	5.284	198	1.646
Female	111	9.74	1.66			

***Significant at 0.05 level; N=200**

The result in Table 4 shows that the mean score of the extents of the utilization of cloud computing between male and female teachers in public secondary schools in Uyo local Government Area were 9.06 and 9.74 respectively. The t-test result gave the t-calculated value of 5.284 and the t-critical value of 1.646. Since the calculated t-value was greater than the critical t-value, the null hypotheses was rejected; therefore, there was a significant difference in the utilization of cloud computing between male and female teachers in public secondary schools.

Discussion of the Findings

The findings of research 1 and 2 indicated that the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools was low. The mean score of females was greater than that of their male counterparts, implying that female teachers utilized cloud computing in the teaching process more than their male counterparts. The corresponding hypothesis revealed that the extent of teachers' utilization of cloud computing in the teaching process in public secondary schools in Uyo Local Government Area is not significant. The findings of this study, on the extent of teachers' utilization of cloud computing in secondary schools did not corroborate with the study conducted by Eto (2009), that the utilization of cloud computing in the teaching process is enormous. Cloud computing allows users to have access to data, applications, and services anywhere. The author opined that by moving ICT infrastructure and software applications to the cloud, SMEs can utilize resources in a more efficient and effective manner, thus giving them business focus. In total, 273 out of 333 teachers responded to the questionnaire.

On the other hand, the results proved that there was a significant difference in the utilization of cloud computing between male and female teachers in public secondary schools. The difference in the utilization of cloud computing among the teachers is connected with the frequency of usage of cloud facilities, which indicated that female teachers utilized the platform more often as compared to their male counterparts. Also, the greater extent of utilization by female teachers compared to males could be related to teacher-student-co-curricular interaction, which female teachers tend to exhibit better than their male counterparts. Also on the subject matter the findings of this study contradict the position of Wajcman (2006) that many feminists believe that western technology embodies patriarchal values. The author argued that most women are reluctant to go into technology because of the sex-stereotyped definition of technology as an activity appropriate for men. The findings from the study show that the gender of both teachers and students does not have any influence on the teaching and learning of mathematics with the use of ICT tools. Also contradicting the findings of this study is the work conducted by Aminu et al. (2019) that showed A study conducted by Aminu et al. (2019) indicated that teachers' ICT integration in teaching is still low, though the majority of the teachers (88.76%) agree that the integration of ICT in teaching and learning activities has brought a positive impact on their students' learning ability. For Nigeria to have effective technology-based teachers at all levels, there is a need to include cloud technology training courses at the teacher's institution, so that the trainer can acquire teaching skills along with ICT skills. This was supported in a study which stated that such an approach has been found to yield better teachers' achievement in handling technological tools (Garba and Alademerin, 2014). Cloud technology use in schools depends solely on the teachers' training, interest, and full implementation of ICT. This would enhance teaching and learning, improve teacher efficacy, and develop learners' ability to use technology.

Conclusion

The study creates awareness of the importance of cloud computing in education as well as exposes the state government and education managers and planners to the position of teachers in the utilization of cloud computing in the teaching process in schools. The study highlights the extent of teachers' utilization of cloud computing in the teaching process based on gender factors and could contribute towards the advancement of education in Akwa Ibom state. The teachers' utilization of the facilities was low.

Recommendations

1. The Akwa Ibom state government, the Uyo local government, and non-governmental organizations should work together to procure and distribute appropriate information and communication technologies to schools for effective teaching and learning.
2. Also, educational administrators should provide enabling environments within the school setting to aid the frequent use of cloud computing facilities for instruction.
3. Similarly, specialized training should be organized to improve teachers' pedagogic knowledge of cloud computing and ICT tools for instructional purposes.

REFERENCES

- Al habri, w. and sonawane, A. (2016). *Cloud computing: New wine or just a new bottle?* IEEEITPro, 15-17.
- Aminu, M and Samah, N. (2019). Teachers' perception on the use of Technology in teaching and learning in associate schools Zamfara state, Nigeria. *Education, sustainability and society*, 2(2), 01-04.
- Cash, J. and B. Konsynski, (1985). IS redraws competitive boundaries. *Harvard Business Review*, 63, 134-142.
- Cuadrado-Garcia M., Ruiz-moLina M., and Montoro-pons J.D. (2010). Are there Gender differences in e-learning use and assessment? Evidence from an Interuniversity online project in Europe. *Elsevier Procedia Social and Behavioral Sciences*, 2 (2010), 367-371.
- Dai, W. (2009). "The impact of emerging technologies on small and Medium enterprises (SMEs). *Journal of Business systems, Governance and Ethics*, 4, 54-60.
- Dhinda, H, S., and Sharizal-Emran (2011). Using interactive whiteboard technology-rich constructivist learning environment to minimize gender differences in chemistry achievement. *International Journal of Environmental & Science Education*, 6(4), 393-414.
- Effiong, I. O. (2013). Exploring cloud computing services and applications" *Journal of Emerging Trends in Computing & Information Sciences*, 3(6), 12-20.
- Etro, F. (2009). The economic impact of cloud computing on business Creation, Employment and output in Europe. *Review of Business and Economic*, 54, 179-208.
- Garba, S. A., and Alademerin, C. A. (2014). Exploring the readiness of Nigeria College of education toward pre-service teacher preparation for technology integration. *International Journal of Technology and Inclusive Education (IJTIE)*, 11, 105.
- Kadijevich, D. (2000). Gender differences in computer attitude among ninth- Grade students. *Journal of Educational Computing Research*, 22(2), 145-1854
- Kaino, L. M. (2008). Usefulness and enjoyment of using computers in learning. A gender dimension. *Gender & Behaviour*. 6(2), 1841-1857
- Kay, R. (2006). Addressing gender differences in computer ability, attitudes and use: the laptop effect. *Journal Educational Computing Research*, 34(2) 187-211.

- Li, N. and Krikup, G. (2007). Gender and cultural differences in internet use: A study of China and the UK. *Computers & Education*. 48(2), 301.
- Mahmood, A and Bokhari, N. H. (2012) use of information and communication Technology: Gender differences among students at tertiary level. *Journal of Educational and instructional studies in the world*, 2(4), 12-22.
- Mathew, U. (2015). Effects of improvised materials on student's Achievement and retention of the concept of radioactivity. *African Research Review and International Multi-Disciplinary Journal, Ethiopia*, 5(1), 342-348.
- Milis K., wessa P., Poelmans S., Doom C., Bloeman E. (2008). *The impact of Gender on the acceptance of virtual learning environments*. ICERI 2008. International conference of education, research and innovation. 17th -19th
- Mirzaei, N. (2009). *Cloud computing*. Available at: http://grids.ucs.indiana.edu/ptlpages/publications/reportNarimanMirzaei_jan09.pdf (National Institute of Standards and Technology, NIST, 2011).
- Orij, S. and Maekae, K. (2013). Effect of computer assisted instructional package on secondary students performance in introductory technology in Ilorin, Nigeria. *Nigeria Journal of Education Media and Technology*, 12, 98-107
- Sanda, H.U. and Kurfi, M.H. (2013). Gender and information communication Technologies (ICT) in Nigeria: Challenges and prospects. *Global Journal of Human Social Science sociology and Culture*, 13(6), 208.
- Wajcman, J. (2006). Feminist perspective on technology. In Teich, A. H. (ed) *Technology and the future*. Pg. 67-79. Thomson Wardworth
- Zhou G. and XU J. (2007). Adoption of educational technology: How does gender matter. *International journal of teaching and learning in higher Education*, 19(2), 140-153.