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E-Learning Readiness in the Teaching and Learning of Mathematics in Secondary Schools in Mezam Division

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Abstract:

Mathematics is the backbone of technological breakthrough and this becomes even more evident in this digital age. Students are very much engaged with technological tools while teachers tend to ignore the technologies, whereas there is need for teachers engage with digital curriculum and teach and supervise students' academic works using these technological tools. The purpose of this study was to determine the E- Learning readiness of some selected secondary schools in Mezam division. This study adopted a descriptive survey design. Two research questions and one null hypothesis formulated at 0.05 level of significance guided the study. The population of the study was made-up of some secondary school students and mathematics teachers of Mezam division. The accessible population of the study was made up of 250 students and 12 mathematics teachers. Data was collected using structured questionnaire. The reliability of the instrument was established using Cronbach alpha and the index obtained was 0.79. Data collected was analyzed using percentages. The findings revealed that mathematics teachers do not possess ICT skills required for e-learning and teaching of mathematics. The results also revealed that students possess ICT skills required for e-learning but do not exploit these skills to improve on the learning of mathematics.

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It was concluded that mathematics teachers do not possess ICT skills required for e-learning of mathematics and so must build up their capacities. Based on the findings of the study, it was recommended that teachers should engage in digital curriculum and upgrade their teaching from chalk and blackboard to e-learning with the aid of ICT. It is also recommended that government should improve on the ICT tools in multimedia available centers in some schools.

Introduction

Mathematics is indispensable in the scientific and technological advancement of every nation. In this digital age, the role played by mathematics becomes even more evident for the progress of any technological development of a nation. Awofala (2012) posits that mathematics is the backbone of technological breakthrough and it is the key to other science disciplines such as engineering and technology (Cheny, 2020). According to Chinweoke (2015), the importance of mathematics in the economic, technological and scientific development of any nation has made its teaching and learning in secondary schools very important. In spite of the policy laid by the educational reform of 1988 to integrate ICT in schools, a large number of secondary schools in the rural areas are yet to construct multimedia centers within their school environment, though computer studies/ICT are taught as subjects in the school syllabus. ICT has evolved to more sophisticated technologies like e-learning and/or virtual classrooms. In Cameroon, e-learning is considered a learning process that works mostly in universities which is a fallacy. Recently, the ministries of secondary and basic education have been struggling to implement e-learning in both primary and secondary schools which is an inescapable reality nowadays. Generally, many opportunities abound with technologies, unfortunately, mathematics teachers resort to making students to be slaves to available textbooks. The real challenge lies in not only ensuring that certain preconditions are met for e-learning, such as access to ICT tools, networks and literacy, but also that of how to change the perception of teachers and learners towards e-learning.

Despite the importance of this subject, there has been a general outcry of low achievement in the subject in both the school examinations and certificate examination (CGCE, 2019, 2020 & 2021). Although many changes have been made in the content and setting of GCE questions, students still consider mathematics as a difficult subject. This perception of students towards mathematics may contribute to the poor achievement in the subject. Many secondary school teachers have glued to the text books, chalk and blackboard. Digital resources are available for teaching and learning and are unexploited by teachers. Secondary school students of this era have a flair for the digital tools with the emergence of Information and Communication Technology (ICT), a policy framework was put in place in Cameroon concerning the integration of ICT into education (1998) and most schools within the Mezam urban area have multimedia centers within their institutions which are exploited by computer teachers for computer courses.

Statement of problem

In this digital age, most students tend to be glued to the internet and wish to be involved in a more personalised learning rather than stay in a brick and mortar classroom. Most teachers still adhere to the chalk and talk method with little or no attention given to classroom practical exercises which is highly required in mathematics. This is due to the fact that most lessons in secondary schools last for 40-45 minutes and the teachers cannot give enough exercises to the students to practice within that period. Also students don't always do the assignments given to them because they spend a lot of time after

school watching television or playing computer games or browsing the internet. Most students tend to be in vogue with the modern trends and so if the teachers could exploit that zeal in them by giving assignments which could be done online it may be a plus to their achievement in mathematics. Giving the technological demands of the world, some examinations now are computer based or online.

E-learning is commonly used in tertiary institutions in Cameroon but its usability at secondary school levels is yet to be a reality. Although many secondary school students have a good mastery of the internet, it is worth noting that their interactions with these tools are highly not educative. There is need for secondary school teachers to come out of the analogue approach and face modern realities by guiding the students to engage on e-learning. How ready therefore are the teachers and students to integrate technology into meaningful mathematics teaching and learning?

Objective of the study

The main purpose of this study was to determine the E- Learning readiness of some selected secondary schools in Mezam division.

Specific objectives of the study were as follows:

- 1) To investigate the readiness of mathematics teachers in terms of skills and training in using ICT tools for teaching mathematics.
- 2) To investigate the readiness of students in terms of skills and training in using ICT tools for learning mathematics.

Research Questions

The following research questions guided the study

- 1) What skills do mathematics teachers possess in the use of ICT for e-learning?
- 2) What skills do students possess in the use of ICT for e –learning of mathematics?

Hypothesis

The following null hypothesis was tested at 0.05 level of significance

H₀: There is no significant difference in the mean responses of students and teachers as to the skills they possess in the use of ICT for e-learning in mathematics.

H_a: There is a significant difference in the mean responses of students and teachers as to the skills they possess in the use of ICT for e-learning in mathematics.

Literature review

The integration of technology into education has been an ongoing process for the past two decades (Ouma, Awuor & Kyambo, 2013). The first online lecture through the Virtual

Instructional Classroom was officially recorded in 1993 by Graziadei (Cross, 2005). E-learning has been described as the delivery of course content through electronic means which include computer-based learning, online learning and distance education (Bhattacharya & Sharma 2007). According to Voogt & Knezek (2008), it can also be considered as the amalgamation of modern technology into the classrooms which can sometimes include learning that is completely independent of mediation. In the opinion of Olatokun & Opesade (2008), e-learning is most widely used in schools, colleges and

universities which have paid special attention to e-learning in order to advance the learning procedures. The use of technology in learning can be referred to as electronic learning (e learning) which comprises a wide range of applications and processes designed to deliver instruction through electronic means (Ouma, Awuor & Kyambo 2013). E-learning signals a paradigm shift in education and its profound effect on education cannot be underestimated. According to Ouma, Awuor & Kyambo (2013), E-learning platform can only be managed and used by people with some level of technical skills. Broadley (2012) affirms that teacher's perceptions and attitude towards e-learning play a critical role in e-learning implementation besides teachers' ICT capacity. This is because e-Learning has become ubiquitous, faster and increasingly accessible to non-technical communities, social networking and collaborative services have grown rapidly, enabling people to communicate and share interest in many more ways. Sites like Facebook, Twitter, Linked-in, Youtube, Flick'r, Second life, Delicious, Blogs, Wikis and more have made people of all ages rapidly share their interest with others everywhere. Many students have engaged in some of these sites for simple communications but not for academic purposes.

Loong & White (2004) observed that the web has resources of varying levels of interactivity and functionalities that can be exploited by teachers to teach mathematics. The different strategies teachers typically use in a mathematics classroom can be further enhanced or replaced with the use of web objects that are available on the web (Barnes & Loong, 2003). It was concluded that the World Wide Web has the potential to be a significant resource in mathematics education. The variety and interactive nature of the materials available can make mathematics teaching much easier and enable students to visualize mathematical concepts in ways that were previously not easily achieved without e-learning. The e-Learning platforms are underutilized (Ebirim, 2011, Nwagbo & Ugwuanyi 2015) but there are some teachers who are beginning to explore the possibilities and so it is important that these explorations are investigated in order to make the best use of internet to enhance students' understanding of mathematics. According to Karim & Hashim (2004), e-learning implementation by any institution can be achieved using either the technologies to support or supplement the traditional face-to-face course, integrating online activities into a traditional course to enhance the learning experience, and delivering a course that is entirely online. The adoption of any of these approaches by an institution depends on the level of readiness in terms of the budget, infrastructure and human resources such as experience, skills, knowledge and attitude (Karim & Hashim, 2004).

A big portion of internet users is made up of youths most of them are teenage college students who may be referred to as digital natives. In a recent survey of 3000 students from across the United States according to Dahlstorm, De Boor, Grunwald & Vockley (2011), it was found that 90% of senior secondary school students use face book and 37% use twitter. Although the youths are mastering the digital world more than the adults, there is need to censor the activities and contents of what these young people access.

Many studies have been done to investigate the impact of e-learning on the academic performance of students. In another study, Iji, Honmane & Omenka (2016) investigated the effectiveness of Global System for Mobile Communication (GSM) approach on students' achievement in mathematics. The findings of the study revealed that the students taught using GSM improved more in their geometry than those taught without using GSM. These studies considered the impact of e-learning media in teaching and learning without checking the readiness of schools to use e-learning. Many secondary school teachers possess smart phones which are used mostly for social interactions. Some are ignorant of the fact that such phones can be used for educative purposes like accessing students' works and

getting feedbacks from students on the conduct of a lesson. Most students are equipped with smart phones which are used for social interactions. Englander et al (2010) in a study observed that students spent more time using social media for other purposes rather than for educational use, thus affecting their academic performance negatively. It can be inferred that the use of technology such as the internet may influence academic performance positively or negatively depending on the management. This has a bearing on some learning theories.

Bandura (1977) propounded a theory which states that learning by observing behaviour could account for wide range of learning experiences that occur in the real world. Three types of modelling were outlined in the theory which includes live model (the actual person demonstrates), verbal instruction and symbolic instruction (via media). Bandura (1977) posits that learning is not purely behavioural; rather it is a cognitive process that takes place in a social context. Also, it was noted that learning occurs by observing behaviour or the consequences of that behaviour, extraction of information from the observation and then make decisions about the performance of the behaviour. Finally it was concluded that the learner is not a passive recipient of the information but that cognition, environment, as well as behaviour mutually influence each other. There is need to investigate the readiness of teachers and students regarding their skills to e-learning and also the logistics to accommodate e-learning.

Methodology

This study adopted a descriptive survey design. The study was carried out in some selected secondary schools in Mezam division of North West Region of Cameroon. The target population of the study comprised of students and mathematics teachers in some schools in Mezam division. The accessible population was made up of 250 students and 12 mathematics teachers that were sampled using random sampling technique. The instrument used for data collection was structured questionnaire designed by the researchers. The instrument was validated by two experts, one from measurement and evaluation and the other from mathematics education all of the university of Bamenda. The reliability of the instrument was established using Cronbach alpha (α) and the value obtained was 0.79. Data collected was analyzed using percentages. 6, 50% was the average value or bench mark used.

Results

Research Question One

What skills do mathematics teachers possess in the use of ICT for E-learning?

Table 1: Frequency and Percentages of Respondents' on ICT Skills possessed by Mathematics teachers for E-learning

	Item Statement on ICT Skills	N = Possessed Freq. (%)	12 Not Possessed Freq. (%)
1.	Can you turn on a computer	10 83.3	2 16.7
2.	Use short key to save a file	5 41.7	7 58.3
3.	How to copy information	8 66.7	4 33.3
4.	How to use CD ROM	5 41.7	7 58.3
5.	How to close a computer	10 83.3	2 16.7

6.	What is the country code for Cameroon?	7 58.3	5 41.7
7.	What does WWW stand for	8 66.7	4 33.3
8.	The name of the search engine	7 58.3	5 41.7
9.	What is used to share printed and scanned documents	8 66.7	4 33.3
10.	The name of the most popular browser	8 66.7	4 33.3
11.	Referring to the capacity of a computer to store data	7 58.3	5 41.7
12.	Manipulating data by sorting, calculating and updating	7 58.3	5 41.7
13.	External devices for storing data	10 83.3	2 16.7
14.	How to log into the internet service provider(ISP)	5 41.7	7 58.3
15.	What to do to navigate a webpage	7 58.3	5 41.7
16.	How to download files using any browser	9 75.0	3 25.0
17.	How to resolve common errors like page out	7 58.3	5 41.7
18.	What are pdf files	9 75.0	3 25.0
19.	How to view pdf files	9 75.0	3 25.0
20.	The procedure for opening an email with attachment	10 83.3	2 16.7

Result in Table 1 showed the frequencies and percentages of respondents' on the skills possessed by mathematics teachers in the use of ICT for E-learning. Mathematics teachers possess the following ICT skills on item 1, 3, 5-13, 15-20 at frequencies and percentages higher than (6, 50%). Since, (6, 50%) is the average value or bench mark used, items 2, 4 and 14 therefore showed that the above items are not possessed at frequencies and percentages higher than (6, 50%). This implied that mathematics teachers should possess ICT skill at higher frequencies and percentages particularly in those items that showed not possessed for E-learning.

Research Question Two

What skills do students possess in the use of ICT for E-learning

Table 2: Frequency and Percentages of Respondents' on ICT Skills possessed by Mathematics Students for E-learning

S/No	Item Statement on ICT Skills	N = Possessed Freq. (%)	250 Not Possessed Freq. (%)
1.	Can you turn on a computer	250 100	- -
2.	Use short key to save a file	226 90.4	24 9.6
3.	How to copy information	229 91.6	21 8.4
4.	How to use CD ROM	210 84.0	40 16.0
5.	How to close a computer	237 94.8	13 5.2
6.	What is the country code for Cameroon?	206 82.4	44 17.6
7.	What does WWW stand for	230 92.0	20 8.0
8.	The name of the search engine	192 76.8	58 23.2
9.	What to use to share printed and scanned documents	232 92.8	18 7.2
10.	The name of the most popular browser	248 99.2	2 0.8
11.	Referring to the capacity of a computer to store data	232 92.8	18 7.2

12.	Manipulating data by sorting, calculating and updating	230 92.0	20 8.0
13.	External devices for storing data	205 82.0	45 18.0
14.	How to log into the internet service provider(ISP)	236 94.4	14 5.6
15.	What to do to navigate a webpage	196 78.4	54 21.6
16.	How to download files using any browser	250 100.0	- -
17.	How to resolve common errors like page out	196 78.4	54 21.6
18.	What are pdf files	250 100.0	- -
19.	How to view pdf files	218 87.2	32 12.8
20.	The procedure for opening an email with attachment	218 87.2	32 12.8

Result in Table 2 showed the frequencies and percentages of respondents' on the skills possessed by mathematics students in the use of ICT for E-learning. Mathematics students possess ICT skills on all the items at frequencies and percentages higher than (6, 50%). Since, (6, 50%) is the average value or bench mark used in this study, mathematics students only showed not possessed of ICT skills at low certain frequencies and percentages. This implied that mathematics students of schools in Mezam urban possess ICT skills for E-learning.

Hypothesis One

There is no significant difference in the mean score of mathematics teachers and students on ICT skills possessed for E-learning.

Table 3: t-test of the mean score of mathematics teachers' and students' on ICT skills possessed for E-learning

S/N	Items Statement on ICT Skills	Teacher Student N=12 N=250							
		\bar{x}	SD	\bar{x}	SD	Df	t-cal	Sig.	Dec.
1.	Can you turn on a computer	0.83	0.39	1.00	0.00	260	-7.04	0.00	S
2.	Use short key to save a file	0.42	0.52	0.90	0.30	260	-5.36	0.00	S
3.	How to copy information	0.67	0.49	0.92	0.28	260	-2.91	0.00	S
4.	How to use CD ROM	0.42	0.52	0.84	0.37	260	-3.82	0.00	S
5.	How to close a computer	0.83	0.39	0.95	0.22	260	-1.67	0.10	NS
6.	What is the country code for Cameroon?	0.58	0.52	0.82	0.38	260	-2.10	0.04	S
7.	What does WWW stand for	0.67	0.49	0.92	0.27	260	-3.01	0.00	S
8.	The name of the search engine	0.58	0.52	0.77	0.42	260	-1.46	0.15	NS
9.	What to use to share printed and scanned documents	0.67	0.49	0.93	0.26	260	-3.24	0.00	S
10.	The name of the most popular browser	0.67	0.49	0.99	0.09	260	-8.23	0.00	S
11.	Referring to the capacity of a computer to store data	0.58	0.52	0.93	0.26	260	-4.25	0.00	S

12.	Manipulating data by sorting, calculating and updating	0.58	0.52	0.92	0.27	260	-3.98	0.00	S
13.	External devices for storing data	0.83	0.39	0.82	0.39	260	0.12	0.91	NS
14.	How to log into the internet service provider(ISP)	0.42	0.52	0.94	0.23	260	-7.16	0.00	S
15.	What to do to navigate a webpage	0.58	0.52	0.78	0.41	260	-1.63	0.11	NS
16.	How to download files using any browser	0.75	0.45	1.00	0.00	260	-9.09	0.00	S
17.	How to resolve common errors like page out	0.58	0.52	0.78	0.42	260	-1.63	0.11	NS
18.	<i>What are pdf files?</i>	0.75	0.45	1.00	0.00	260	-9.09	0.00	S
19.	<i>How to view pdf files</i>	0.75	0.45	0.87	0.34	260	-1.21	0.23	NS
20.	<i>The procedure for opening an email with attachment</i>	0.83	0.39	0.87	0.34	260	-0.39	0.70	NS
	Cluster t	0.65	0.13	0.90	0.11	260	-7.75	0.00	S

Result in table 3 showed the t-test analysis of the significant difference between the mean score of mathematics teachers and students on ICT skills possessed for E-learning. Result showed that the cluster t-value of -7.75 with a degree of freedom of 260 and a significant value of 0.00 was obtained which is lesser than 0.05 level of significant. Hence, the null hypothesis which stated that there is no significant difference between the mean score of mathematics teachers' and students' on ICT skills possessed for E-learning is rejected. Inference drawn from the data shows that the mean score of mathematics teachers (0.65) and students (0.90) differ significantly on ICT skills possessed for E-learning. This significant difference in their mean score may be due to high mean score of the ICT skills possessed by mathematics students.

Discussion of findings

The findings of this study showed that mathematics teachers do not possess enough ICT skills required for E-learning. This is in line with the findings of Yang & Huang (2008) who found out that teachers do not fully use ICT in teaching and learning even when their schools were fully equipped with technological gadgets. This also affirms with Broadley (2012) that teacher's perceptions and attitude towards e-learning play a critical role in e-learning implementation besides teachers' ICT capacity. E-Learning has become universal, faster and increasingly accessible to non-technical communities, social networking and collaborative services have grown rapidly, enabling people to communicate and share interest in many more ways. Furthermore, this finding agrees with the observation by Agwagah (2017) that the implementation of ICT in schools was yet to be accepted by the teachers. Some reasons for the inability to implement ICT in schools include: lack of ICT facilities in schools and teachers resistance to acquiring adequate ICT tools which can assist them in teaching amongst others.

The results also revealed that students possess ICT skills required for E-learning. This is in collaboration with the opinion of Ouma, Awuor & Kyambo (2013) who stated that E-learning platforms can only be managed and used by people with some level of technical skills. The finding of Dahlstorm, De Boor, Grunwald & Vockley (2011) revealed that 90% of senior secondary school students use face book and 37% use twitter.

Conclusion

Mathematics teachers do not possess enough ICT skills required for e-learning whereas the students possess the required skills and are proficient users of modern communication technologies. It was also observed that some of the schools in Mezam urban were equipped with outdate ICT tools and the multimedia centers were frequently used by computer science teachers while mathematics teachers are more proficient in using the chalk and the blackboard.

Recommendation

Based on the findings of this study, the following recommendations were made:

- 1) There is need for mathematics teachers to empower themselves with the basic skills of ICT and the usage of these tools in the teaching learning process in and out of classrooms.
- 2) The state government should ensure even distribution of ICT facilities and equipment to all schools irrespective of their location so that rural schools can also experience the benefits of technology in the teaching and learning of mathematics.

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