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Abstract

Paper has been a convenience medium of communicating information, accessing information, as well as delivering and receiving lecture. However, as time changes, the mode of communication and instructional methodology takes a paradigm shift. This has resulted to the use of paperless classroom. Paperless classroom is the use of computing and communication technologies to replace the traditional method of teaching and learning in the classroom. It offers speed and ease of using electronic means in delivering lecture to a large number of students which is cost effective to students and lecturers. Consequently, schools are using computing technologies to ease the cost and stress of using paper-based classroom. Notwithstanding, despite the benefits of using computing technologies in facilitating paperless classroom, there is a poor usage of computing technologies towards promoting or achieving a paperless classroom in library schools in Rivers State, Nigeria. However, colleges, universities and schools have different approaches when putting in place the paperless classroom. Thus, the study investigated computing technologies and paperless classroom in library schools in Rivers State. Two objectives, two research questions and two hypotheses guided the study. The study adopted a correlational research survey design. The population of the study was 45 lecturers in library schools in Rivers State. Census sampling technique was used to select the respondents. Questionnaire was used to gather the data. 37 copies of the questionnaire were found valid for analysis. The data was analysed using mean scores and standard deviation for research questions and Pearson Product Moment Correlation (PPMC) to test the hypotheses. The study revealed that there is a significant relationship between mobile computing, cloud computing and paperless classroom in library schools in Rivers State. The study recommended that library schools management should as a matter of policy implement the use of computing technologies in library schools in Rivers State.

Keyword: Computing technology, mobile computing, cloud computing, paperless classroom, library school

Introduction

The development in technologies has affected the mode of teaching and learning in the academia. Thus, as innovations proliferate, transformation takes place. Consequently, the mode of communication has taken a paradigm shift from clay tablets, papyrus and vellum to paper which too is slowly losing its coveted place to digital resources resulting to the adoption of paperless classroom. Paper-based materials such as printed books; journals, lecture notes and printed assignment have been the means of communication between educators and students including Library and Information Science (LIS) educators. This has been the traditional method adopted by educators and students where the educators give students note to photocopy write or dictate to the students, while the students make copy or write. It is even becoming unbearable due to the cost attached to paper-based method and unsatisfactory that students are limited to physical class just to enable them copy or write notes while also leading to much usage of paper which constitute a threat to 'save paper, 'save-tree' and "go green" initiative. As a result, schools including library schools have resulted to adopting a paperless classroom.

Paperless classroom according to Bassey et al, (2007, as cited in Oyekunle et al, 2017) is when the use of papers in that classroom is fully replaced by Information Technology equipment or is placed side-by-side the paper in the instructing or impartation of knowledge from the lecturer to the student. Graven (2017) opined that with paperless classroom, students do not have to make photocopies of each handout which is a tedious task, Rather than photocopying, a document can be uploaded to smart board. Thus, there is no longer any need for students to carry heavy textbooks to class. This is because in paperless classroom, all textbooks, lecture notes and students' work can be stored on the iPad. Therefore, teachers can upload the course content to Smartboard, projector using power point and students can access and work on course content wherever and whenever they wish, and interact with their teacher by using computing technologies.

In this study, paperless classroom is not just the use of electronic devices or resources within the classroom to replace the paper and pen method, rather it is the use of computing technologies such as mobile computing including laptop, tablet, ipad, projector, smartboad etc; and cloud computing contents including electronic resources such as e-lecture notes, e-book, e-journals, e-power point, and cloud computing software packages such as zoom, skype, Learning Management System, email, etc in teaching and learning. It is not limiting the use of electronic

resources within the physical classroom because classroom itself has transformed to virtual classroom where services are rendered in the virtual environment using computing technologies.

Computing Technology according to Technopedia (2021) is the process of using computer technology to complete a given goal-oriented task. Computing may encompass the design and development of software and hardware systems for a broad range of purposes. It also has specific meanings depending on the context and field in which it is used. For example, cloud computing, social computing, ubiquitous computing, parallel computing and grid computing all fall under the umbrella of the general meaning of computing while still having a specific purpose and definition separate from each other.

In this study, Computing Technology is a combination of software and hardware packages that is interactive and ubiquitous in nature. Generally it could be computer, tablets and smart phone, the web, email, text, social media etc. Specifically however, it can be inform of mobile computing and cloud computing.

Mobile computing is human-computer interface which a multimedia resources such as data, text, image, voice and video can be communicated and or transmitted using computers or wireless devices. It involves the use of mobile hardware and software packages such as laptops, smartphones, tablet Pc's, Personal Digital Assistants, mobile software packages such as simbian, windows mobile and application software like mobile social media including facebook, whatsapp and twitter. On the other hand, cloud computing is a means for enabling convenient and on-demand network access to a distributed pool of configurable computing resources such as networks, servers, storage, applications as well as services that can be speedily provisioned and allows for minimal management effort and service provider interaction(National Institute of Standards and Technology, as cited in Kuliya et al, 2015) example included email, yahoo groups, facebook and googleDoc, zoom, skye etc. Due to the importance of computing technologies, they are being exploited by library schools to facilitate paperless classroom.

Library schools are higher institutions with the mandate to train students to become librarians who can cope competently and confidently with the resources and information services in libraries and information centres. While some library schools are practically utilizing computing technology in LIS education particularly in the developed countries, it is still being

envisioned in the developing countries like Nigeria. However, this study is focused on the use of computing technologies in library schools in Rivers and whether the use of computing technologies has a significant relationship in facilitating paperless classroom.

Statement of the Problem

Paper has been a convenience medium of communicating information, accessing information, as well as delivering and receiving lecture. However, as time changes, the mode of communication and instructional methodology follow suit. This has resulted to the use of paperless classroom. Paperless classroom offers speed and ease of using electronic means in delivering lecture to a large number of students which is cost effective to students and lecturers. Consequently, schools are using computing technologies to ease the cost and stress of using paper-based classroom. Many universities and schools are using computing technologies like the mobile computing which included tablets, personal computers, projectors, smart boards as well as cloud computing such as email, facebook, yahoo groups, googleDoc, etc in the classroom to enhance students' academic performance. Notwithstanding, despite the benefits of using computing technologies in facilitating paperless classroom, preliminary observation from the researcher seems that there is a poor usage of computing technologies toward promoting or achieving a paperless classroom . However, colleges, universities and schools have different approaches when putting in place the paperless classroom and studies have been conducted to unravel the adoption of paperless classroom but no study based on literature and to the researcher's knowledge has been conducted to investigate Computing Technologies and Paperless Classroom in Library Schools, particularly in Rivers State. It is based on this gap the study investigated 'Computing Technologies and Paperless Classroom in Library Schools in Rivers State".

Objectives of the Study

The main objective of the study was to determine the relationship between computing technologies and paperless classroom in library schools in Rivers State. Specifically the objectives sought to:

1. Determine the relationship between mobile computing and paperless classroom in library schools in Rivers State
2. investigate the relationship between cloud computing and paperless classroom in library schools in Rivers State

Research Questions

1. What is the relationship between mobile computing and paperless classroom in library schools in Rivers State?

2. What is the relationship between cloud computing and paperless classroom in library schools in Rivers State?

Hypotheses

Ho$_1$ There is no significant relationship between mobile computing and paperless classroom in library schools in Rivers State

Ho$_2$ There is no significant relationship between cloud computing and paperless classroom in library schools in Rivers State.

Literature Review

Baby and Saeed (2020) posited that in paperless classroom teachers and learner cannot use textbooks and notebooks for instructional purposes. They can use only computers, laptops, iPads or any other technological devices. All the examinations, assignments, quizzes, tests, and even grading should be done without the aid of pen and paper. All the activities related to the educational requirement should be done electronically. Slowinski (2000) noted that in such classrooms, there is no physical exchange of information or learning materials between the teacher and the student but only an exchange of knowledge in virtual space. In a study conducted by Eseyin et al, (2020) on teachers rationale and implementation of paperless classrooms for the attainment of sustainable development goals in public universities in Rivers State, it was discovered that teachers supported paperless classroom by using available media resources and other technology to enforce paperless instructions where they were likely involved in bringing their personal technological devices as a way of enforcing a paperless classroom for the attainment of outlined sustainable development goals in Rivers State. Kuriakose and Luwes (2016) in a related study revealed that instructors made use of presentations animated videos and multimedia to better explain their course content to students.

Pinpointing the importance of using mobile computing in paperless classroom, Adeboye (2016) noted that rather than have students write a 2000 word essay after researching on a topic,

where several of them would simply copy and paste paragraphs without necessarily understanding the content, lecturers could ask students to research and create a 5 minutes or less video or audio recording of what they had researched about. Reporting a study conducted at the University of KwaZulu-Natal, the author noted that 92% of students emphasized that it is easier to use their mobile devices such as tablets and mobile phones to enhance their access to information because they would be able to find anything they want to find, right at the time they need and also helps to reduce the need for excess notes and textbooks to be carried around during lecture times.. Igwela and Nsirim (2018) noted that with mobile social media, services can be rendered even while in a taxi or a queue because it can be used to access online discussion forums. Moorleghen et al (2019) investigated the impact of automated response systems on in-class cell phone use and revealed that although, cell phones have long been known as a potential distraction from attention intensive activities such as studying and driving, many students consider it and other mobile devices such as tablets, laptops as a powerful tool to enhance classroom learning. BlockDeaton et al. (2013) found that mobile learning devices, such as iPads, are being used to enhance the science classroom experiences and promote collaborative learning and content research and can encourage students to become creative, critical thinkers, problem solvers, and effective users of technology.

Discussing how cloud computing can be used to promote paperless classroom, the Freshno Pacific University (2021) noted that teachers can create virtual classrooms using third-party platforms such as Skype, Zoom, Google Hangouts and BlueJean, secure data by storing information on remote, secured databases offered by third parties, schools, teachers can quickly update or change lesson plans based on what is and is not working with students using cloud computing tools. They also can modify content as new tools become available, cloud-based tools allow teachers to set up virtual spaces where students can collaborate from any location using their favorite device and cloud computing also offers software systems to handle many of the routine tasks handled by school administration and teachers, freeing up time for more creative endeavors which is likened to automation. Cloud computing can also be used to record lectures for students to listen to and take notes on at their convenience, uploaded documents and links to resources for students, e-learning materials such as e-lecture notes, e-books and e-journals, posting grades, virtual tours to distant places, creating online chat rooms and discussion boards

where students can meet and collaborate (such as Google Hangouts), creating dashboards to track student progress. Wahyuni and Maharani (2020) investigated the use of mobile learning applications to support paperless classroom pedagogy and discovered that teachers made use of Edmodo, a system that allowed teachers to store teaching and learning materials, assignments, administer quizzes, and carry out learning activities. In addition, to facilitate teaching and learning activities inside the classroom, the teacher employed mobile applications including Google Drive, Google Slides, and Google Docs. Besides, the students explored information and additional learning materials through E-dictionary, Google Translate, Google Images, Google-dictionary, and Wikipedia.

Methodology

The study adopted a correlational research survey design. The population of the study was 29 Library and Information Science Educators in library schools in University of Port Harcourt (7), Rivers State University, Port Harcourt (8) and Ignatius Ajuru University of Education Port Harcourt (7) and Captain Elechi Amadi Polytechnic, Port Harcout (8). Census sampling technique was used to select all the respondents because the population was not large . Questionnaire titled "Computing Technologies and Paperless Classroom Questionnaire" (CTPCQ) was used to gather the data. . Each of the items on the questionnaire was assigned a 4-point rating scale of Strongly Agree (SA) - 4 points; Agree (A) – 3 points; Disagree (2) – points; and Strongly Disagree (SD). Out 29 copies of the questionnaire distributed, 27 copies were found valid for analysis. The data was analysed using mean scores and standard deviation for research questions and Pearson Product Moment Correlation (PPMC) to test the hypotheses. The real limits of numbers of the mean rating: 3.50-4.00 = Strongly Agree (SA), 2.50-3.49 = Agree (Agree), 1.50-2.49= Disagree (D), and 1.00-1.49 = Strongly Disagree (SD) were used to interpret the results. The decision on the hypothesis was based on the probability value (P< 0.05), which implies that the null hypothesis would be rejected if the p-value is less than 0.05 but accepted when (P>0.05).

Results and Discussion

Research Question One: What is the relationship between mobile computing and paperless classroom in library schools in Rivers State?

Table 1: Summary of Mean Scores and Standard Deviation of the Relationship between Mobile Computing and Paperless Classroom in Library Schools in Rivers State

S/N	How do you use mobile computing to support paperless classroom in your department?	x̄	±	Decision
1	Use of projector/smart board in presentation	3.3	3.5	Agree
2	Use of mobile devices to deliver lecture and allow students to record or type with their mobile devices	2.1	2.1	Disagree
3	Record lectures using mobile devices and send to the students via online forum to download and learn	2.3	2.2	Disagree
4	Use of multimedia resources with projector/smartbaord in teaching	1.5	1.7	Disagree
	Weighted Mean	2.3<2.5	2.3	Disagree

Result from table one shows the summary of mean scores and standard deviation of the relationship between mobile computing and paperless classroom in library schools in Rivers State and revealed that item 1 has mean score of 3.3 and standard deviation of 3.5. This indicates that most of the respondents agreed that in order to support paperless classroom, they use of projector/smart board in presentation. On the other hand items 3 has mean score of 2.3 and standard deviation of 2.2.This indicates that most of the respondents disagreed that in supporting paperless classroom, they recorded lectures using mobile devices and sent to the students via online forum to download and learn. Item 2 has mean score of 2.1 standard deviation of 2.1. This indicates that most of the respondents disagreed they supported paperless classroom by the use of mobile devices to deliver lecture and allowed students to record or type with their mobile devices. Item 4 has mean score of 1.5 and standard deviation of 1.7. This indicates that most of the respondents disagreed that they supported paperless classroom by the use of multimedia resources with projector/smartbaord in teaching. The weighted mean of 2.3 < 2.5 indicates that most of the respondents disagreed that they supported paperless classroom by leveraging mobile computing in teaching and learning. The study is at variant with Moorleghen et al (2019) on the impact of automated response systems on in-class cell phone use and revealed that although, cell phones have long been known as a potential distraction from attention intensive activities such as studying and driving, many students consider it and other mobile devices such as tablets, laptops

as a powerful tool to enhance classroom learning. This could be due to lack of policy and skills to utilize mobile computing in promoting paperless classroom.

Research Question Two: What is the relationship between cloud computing and paperless classroom in library schools in Rivers State

Table 2: Summary of Mean Scores and Standard Deviation of the Relationship between Cloud Computing and Paperless Classroom in Library Schools in Rivers State

S/N	How do you use cloud computing to promote paperless classroom in your department?	$\bar{x}$	$\pm$	Decision
1	Use of yahoogroups to communicate lectures	1.0	1.0	Disagree
2	Use of googleDoc to collaborate with students on project, dissertation or thesis	1.2	1.5	Disagree
3	Use of Zoom/Skye to deliver lecture	1.1	1.2	Disagree
4	Allow students to submit assignment using online platforms such as email	2.6	2.5	Agree
5	Use of google slides in teaching	1.0	1.1	Disagree
	Weighted Mean	**1.4<2.5**	**1.7**	**Disagree**

Table two shows the summary of mean scores and standard deviation of the relationship between cloud computing and paperless classroom in library schools in Rivers State and revealed that item 4 has mean score of 2.6 and standard deviation of 2.5 which indicates that most of the respondents supported paperless classroom by allowing students to submit assignment using online platforms such as email. On the other hand, item 2 has mean score of 1.2 and standard deviation of 1.5. This indicates that most of the respondents disagreed that they used googleDoc to collaborate with students on projects as support to paperless classroom. Item 3 has mean score of 1.1 and standard deviation of 1.2. This indicates that most of the respondents disagreed that they used of Zoom/Skye to deliver lecture as a way of promoting paperless classroom. Item 1 has mean score of 1.0 and standard deviation of 1.0. This indicates that most of the respondents disagreed that they used yahoo groups to communicate lectures to promote paperless classroom. Item 5 has mean score of 1.0 and standard deviation of 1.1. This implies that most of the respondents disagreed that they used google slides in teaching in order to promote paperless classroom. The weighted mean of 1.4 < 2.5 implies that most of the respondents were not using

cloud computing as a way to supporting paperless classroom in library schools in Rivers State. However, the study is inconsistent with the study carried out by Wahyuni and Maharani (2020) on the use of mobile learning applications to support paperless classroom pedagogy and discovered that teachers made use of cloud applications including Google Drive, Google Slides, and Google Docs. Besides, the students explored information and additional learning materials through E-dictionary, Google Translate, Google Images, Google-dictionary, and Wikipedia. This could also be attributed to lack of policy, lack of state of the art infrastructure and lack of skills to apply cloud computing in teaching and learning.

Hypotheses testing

Hypothesis two: There is no significant relationship between Mobile Computing and Paperless Classroom in Library Schools in Rivers State

Table 3: Summary of Pearson Product Moment Correlation (PPMC) on Relationship between Mobile Computing and Paperless Classroom in Library Schools in Rivers State

SN	Variables		Mobile Computing	Paperless Classroom
1	Mobile Computing	Pearson Correlation	1	-.122
		Sig. (2-tailed)		.03
		N	3	37
2	Paperless Classroom	Pearson Correlation	-122.	1
		Sig. (2-tailed)	.03	
		N	37	37

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3: Summary of Pearson Product Moment Correlation on relationship between mobile computing and paperless classroom in library schools in Rivers State and revealed a correlation coefficient r= (-.122) and significant value (sig. 0.03<0.05). The r-value (-122) shows a negative and weak relationship between mobile computing and paperless classroom. The negative and weak relationship could be attributed to the poor response of the respondents which could be due to their inability to utilize mobile computing in classroom. Interestingly however, the sig. value (0.03) shows that there is a significant relationship between mobile computing and paperless classroom in library schools in Rivers State. Thus the hypothesis which stated that there is no

significant relationship between mobile computing and paperless classroom in library schools in Rivers State is rejected.

Hypothesis two: There is no significant relationship between Cloud Computing and Paperless Classroom in Library Schools in Rivers State.

Table 4: Summary of Pearson Product Moment Correlation (PPMC) on Relationship between Cloud Computing and Paperless Classroom in Library Schools in Rivers State

SN	Variables		Cloud Computing	Paperless Classroom
1	Cloud Computing	Pearson Correlation	1	-125.
		Sig. (2-tailed)		.03
		N	37	37
2	Paperless Classroom	Pearson Correlation	-.125	1
		Sig. (2-tailed)	.03	
		N	37	37

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4 shows the summary of Pearson Product Moment Correlation on relationship between cloud computing and paperless classroom in library schools in Rivers State and revealed a correlation coefficient r= (-.125) and significant value (sig. 0.03<0.05). The r-value (-125) shows a negative and weak relationship between cloud computing and paperless classroom. This could be due to their inability of the respondents to utilize cloud computing. However, the sig. value (0.03) shows that there is a significant relationship between mobile computing and paperless classroom in library schools in Rivers State. Thus the hypothesis which stated that there is no significant relationship between cloud computing and paperless classroom in library schools in Rivers State is rejected.

Summary of the Findings

1. There is a significant relationship between mobile computing and paperless classroom in library schools in Rivers State
2. There is a significant relationship between cloud computing and paperless classroom in library schools in Rivers State

Conclusion

Computing technologies have reshaped the methods of education by its application in teaching and learning, and for any institution to sustain in the technology driven academia, they must adopt the necessary technologies to do so. It is so imperative that the use of computing technologies in education, particularly LIS education limits the cutting of trees and promote green effect since papers are made from tree as well as saves students cost and stress. Due to its benefits, they are being used in education to enhance teaching and learning. The study investigated the use of computing technologies in supporting paperless classroom and discovered that the use of computing technologies particularly mobile computing and cloud computing were poor. However, there is a significant relationship between computing technologies and paperless classroom. Therefore, computing technologies are essential in facilitating paperless classroom and enhancing education.

Recommendations

1. Based on the finding of research question one, library schools management in Rivers State should as a matter of policy implementation direct LIS educators to exploit mobile computing devices in teaching and learning in LIS education such as teaching using projector, smart board or laptop instead of writing on the board, and also allow students to use their devices to record lectures, type with their laptops or other mobile devices. Electronic course contents/materials should be made available to students.

2. Based on the finding of research question two, the management of various library schools in Rivers State and beyond should also by policy implementation ensure that LIS educators engage students in teaching and learning using cloud computing such as give students assignment via cloud computing facilities, deliver lecture using zoom, skye or any other virtual classroom platform. They should leverage googleDoc in project supervision.

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