

Dialoguing through E-Mail: An Ict Tool for Science Lesson Delivery in National Teachers' Institute in Akwa Ibom State

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Abstract

The study investigated the impact of integrating dialoguing through e-mail as an ICT tool in science lesson delivery in National Teachers' Institute (NTI) in Akwa Ibom State. Descriptive and quasi-experimental designs were used for the study. Three research questions guided the study. A population of 102 final year science students spread across the six (6) study centres of NTI in the State was used for the study. A Questionnaire and an Achievement Test of 0.72 and 0.78 reliability indexes, structured by the researchers, were instruments used for data collection. Data collated were computed and compared using weighted means and standard deviations according to the research questions posed for the study. Findings from the study revealed that performance of NTI science students who integrated dialoguing through e-mail in their learning process performed better than those who only relied on the programmed printed materials given to them at their study centres. It also indicated a difference in performance between male and female students who integrated dialoguing through e-mail in their learning process, in favour of the males. Lastly the study revealed that high Internet access charges; fluctuation in Network access; inconsistent power supply; inadequate skill on how to operate the computer system; and selectivity of some modems to some environments for Internet accessibility were major factors militating against effective dialoguing through e-mail as an ICT instructional tool. Major recommendations made based on these findings are that lecturers and students of NTI should integrate e-mail dialoguing in their instructional process in order to achieve better performance; female NTI students should encourage themselves to meet up with the current ICT challenges, by enrolling in ICT trainings; improved modems that will be generally friendly to all environments should be produced by highly-skilled technicians for easy accessibility of Internet; and Nigerian government should work in collaboration with non-governmental bodies and philanthropists to solve the problem of power supply.

Introduction

In recent times there has been an intense outcry and advocacy nationally and internationally for the application of Information and Communication Technologies (ICTs) to improve quality in education. The justification being that information tools when properly integrated are capable of bringing about positive academic changes in the classroom. Bassey, Udosen & Udo (2011) asserted that Information and Communication Technology (ICT) has permeated every facet of human lives. The authors stated that with ICT, every sector of human development is moving on a very fast lane, and education is on-board this fast moving train. Tinio (2002) reported that ICTs are powerful enabling tools for educational change and reforms. Yusuf (2007) added that when ICTs are used appropriate in instruction they accelerate, enrich and deepen basic skills in reading, writing, mathematics and other sciences, by way of motivating and engaging students to learn as they become independent and responsible for their learning.

Many authors have defined ICT variously in different perspectives. For instance, Ayodele (2002) in Ihebereme and Onwagboke (2010) defined ICT as electronic based technology generally used to process, package, store, and retrieve information as well as provide access to knowledge. Aluko (2009) described ICT as enabling technologies (both hardwares and softwares) necessary for delivery of voice/audio, data, video, fax and Internet networks. Nwachukwu (2004) as cited by Ihebereme and Onwagboke (2010) opined that ICT is simply the application of computers and other technologies to the acquisition, organization, storage, retrieval and dissemination of information. To Udo, Harrison and Bassey (2010) ICT has to do with the use of various technological facilities/equipment to design, generate, produce and communicate useful and appropriate information to the end users, which may be in form of graphs, images, texts, models and other forms of instructional resources. The key element of all these definitions is that ICT involves the use of some hardwares and corresponding softwares in order to make information and communication flow faster, cheaper and with much convenience.

Since everybody may not be able to attend conventional schools due to one challenge or the other, the government of Nigeria has designed other modes of attaining academic heights by putting in place distance

learning programmes to accommodate people who want continuity in their academic pursuits. Moreover, Udo (2012) observed that the imperatives of survival including the demands of work places have compelled several people to live and work in places far away from formal institutions, thus propelling the academic-conscious ones to enroll in distance education programmes. By simple definition, Distance Education (DE) is a formal education conducted at a distance for people who are not opportune to attend conventional schools due to constraints of time, work and other demands in order to update skills and or knowledge. It is a mode of teaching and learning in which learners are removed in time and space from the teacher (Obetta & Agboeze, 2010). It implores the combination of a variety of media and technologies to provide and or improve access to quality education for large numbers of learners wherever they may be; by enhancing the abilities of teachers and students to communicate with each other.

One of the goals of Distance Education as stated in Federal Republic of Nigeria (FRN) (2004) is to provide access to quality and equity in educational opportunities for those who otherwise would have been denied. This can be achieved by proper integration of ICTs which offer innumerable benefits in enriching the quality and quantity of teaching and learning. Matsura (2009) as cited by Etim & Udo (2010), confirmed the relevance of ICT in education by reflecting that unless Nigeria makes reforms of her policies on education by strategizing to incorporate new skills and technologies in her teaching of school subjects' contents, she (Nigeria) will have the largest numbers of drop-outs by 2015.

One of the ICT tools that can be used to harness academic potentials of students in DE programmes is the e-mail service, available via the Internet. Orij (2007) noted that e-mail involves the exchange or transfer of messages, information (ideas, thoughts, facts, etc from one person to another. In a recent development, Yusuf (2010) defined e-mail as a worldwide electronic communication system, in which a computer is used to compose messages at one terminal and can be generated at the recipient's terminal. The interactive feature in e-mail allows students experience a realistic learning environment (Moore & Kearsely, 2005). Lesson contents can be structured such that it gingers real conversation amongst students. The instructor dialogues exclusively with the class through electronic means of communication (e-mail). E-mail dialoguing is found to be very useful in an instructional setting. As observed by Paulus (2007), using e-mail dialoguing is helpful for most students because it ignites possible topics and other essay ideas; allows freedom of expression without reservations and gives users a chance to share and read posts from others and to refer back to, at anytime. Dabbagh (2007) identified the following as ways in which dialogical pedagogy can be implemented in online learning situations:

- Setting up online group discussion areas focused around a topic or specific activity, goal or project, using asynchronous discussion forums to promote collaboration and social negotiation. Dabbagh noted some group discussion area can be open-minded and un-moderated, allowing students to solicit information from each other, while others can take the form of a structured online discussion.
- Designing activities that allow group members to share documents related to a group project. When the document is displayed, group members can discuss its contents via e-mail, video-conferencing, or chat.

Whichever one is adopted, e-mail dialoguing encourages real time collaboration activities which allow groups to brainstorm ideas debate problems and develop action plans. In addition, Students in the same area of specialization or discipline who are from different origins or countries can still exchange their opinions, discuss with each other, and share experiences through the Net as they engage in e-mail dialoguing. Thus, the concept of independent, place-bound, adult and self-motivated learner, which largely characterise the classic distance education learner, is now being challenged with socially mediated online learning activities.

However, there have been some identified challenges faced in the course of dialoguing through e-mail that discourage students from using the service frequently. They include: disorganization of files sent, limitation of size of attached files, lack of ubiquitous access, and the possibility of the e-mail to be affected by viruses (Udo, 2012). Apart from the above technical flaws inherent in the e-mail service itself, other prevailing challenges found mostly amongst DE students that may militate against effective integration of ICT tools (e-mail dialoguing inclusive) in teaching and learning, range from employment, socio-economic, education to demographic variables. Others as identified by Obetta & Agboeze (2010) include: high rate of illiteracy; constant power outage; under-utilization of ICT facilities; lack of indigenous maintenance capacity; inadequate tele-communication infrastructure; high Internet access charges; high cost of computer equipment procurement; and ICT phobia.

The Problem

In Nigeria, one of the recognized educational institutions that make use of Distance Learning System (DLS) is the National Teachers' Institute (NTI), Kaduna, with study centers located in all the states of the federation. NTI programs in Nigeria as observed by Udo (2012) still rely heavily on programmed print materials as their major source and mode of instruction. This is against Simonson's (2008) assertion who reported that DE no longer relies on the delivery of prints. With the advent of computer which comes in various forms and sizes, accessing

the e-mail and dialoguing through it for learning, in this new world, becomes easy. Electronic mail can be accessed through networked table or flat-screened computers, cyber cafés and modemed palm and laptops as well as notepad computers, and even the commonly used mobile handsets.

There have also been reports of researches (Nwosu & Udofia, (2010); Ihebereme & Onwuagboke, (2010); and Ekukinam & Udosen (2010)) carried out on the integration and or relevance of ICT in teaching and learning particularly in teacher education. Others have been the assertions of Nbina (2010) and that of Awotua-Efebo (2007) and many others. Of all these researches and assertions, none has specifically tackled dialoguing through e-mail as an ICT tool in DLS programme of NTI. This gap therefore moved the researchers to investigate dialoguing through e-mail as an ICT tool for science lesson delivery in NTI in Akwa Ibom State.

Purpose: The main purpose of this study was to determine the effect of dialoguing through e-mail in science lesson delivery in NTI in Akwa Ibom State (AKS). Specifically, the study sought to:

- determine the effect of dialoguing through e-mail on performance of NTI science students in Biology;
- determine the influence of gender on performance of NTI science students in Biology when dialoguing through e-mail is used for instruction; and
- ascertain the factors militating against effective dialoguing through e-mail in science instructional delivery in NTI in AKS.

Research Questions: The following research questions guided the study:

1. What is the effect of dialoguing through e-mail on performance of NTI science students in Biology?
2. How does gender of NTI science students affect performance when dialoguing through e-mail is used for instruction?
3. What are the factors militating against effective dialoguing through e-mail in science instructional delivery?

Method : Descriptive survey and pre-test, post-test non-randomised quasi-experimental designs were used for the study. The basis for choosing these designs were contingent upon the fact that descriptive survey design enables the collection of data, describing them as they are without any manipulation. (Bowling, 2005). The later design was used because it offers less rigorous control compared to a true experimental design. Moreover, the use of the design is justified by the fact that intact classes were used. There was no randomization.

The study population comprised all the 102 (30 males and 72 females) final year science students of Nigeria Certificate Education (NCE) programme of NTI in all the six (6) study centres of NTI in AKS as at 2011/2012 academic session. The choice for the final year students was based on the fact that they had the largest population compared to the other three levels (ie NCE I, NCE II, and NCE III). The whole population was used for the study since the number was sizeable enough to be managed by the researchers. Thus, there was neither sample nor sampling technique. **Instrument :** Two instruments entitled “Factors Militating against Effective Dialoguing through E-Mail Questionnaire” (FMEDEQ) and “Biology Achievement Test on Basic Ecological Concepts” (BATBEC) were used for data collection. It should be noted here that the branch of science that was emphasized in this study was Biology. Both instruments were designed by the researchers. The 10-itemmed questionnaire which consisted of two sections A & B, was used to elicit information on the possible factors that could militate against effective dialoguing through e-mail, on a 4-point rating scale of strongly agree (4points), agree (3points), disagree (2points) and strongly disagree (1point). BATBEC was designed from the taught lesson (Basic Ecological Concepts), to measure students’ performance before and after the introduction of the research treatment. It consisted of 20 test items of 4-multiple choice lettered A-D, having one of them as the correct answer. Each question carried 5 marks, making a total of 100 marks.

FMEDEQ was validated by two senior lecturers of Computer Science Department, Akwa Ibom State College of Education, Afaha Nsit, while BATBEC was validated by two Biology course tutors (lecturers) of NTI, Calabar study centre, Cross River State, (CRS) who had been teaching Biology in the centre for 5 years. They made corrections and modifications. Reliabilities of the instruments were tested by first administering them to 20 NTI-NCE/DLS students of Calabar study centre in CRS. Then, the reliability coefficients of 0.72 and 0.78 were determined using Cronbach Alpha method for FMEDEQ and Kuder Richardson’s 21 (K-R21) formula for BATBEC, respectively.

Data Collection Procedure: For easy collection of data, the six study centres in the three (3) senatorial districts of the State, were merged into four (4) and later randomly assigned into experimental (N=76) and control (N=26) groups. The two groups were pre-tested using the BATBEC. Scores obtained were collated and kept to be compared with the scores of the post-test after the introduction of the lesson package. After a week those in the control group were taught the lesson “Basic Ecological Concepts” for one hour, using the normal conventional mode of lesson delivery (lecture method) at their study centres, relying only on the printed module provided by NTI.

Students in the experimental group were first sensitized by the researchers at their study centres, and asked to open e-mail accounts if they did not have any. From the e-mail addresses submitted to the researchers, a

mailing list was compiled, through which the same lesson package on “Basic Ecological Concepts” and relevant instructional activities that elicited the achievement of the stated objectives of the lesson, were sent. Furthermore, those in the experimental group were encouraged to discuss their instructional activities, experiences, or problems encountered through e-mail by dialoguing amongst themselves and with the researchers.

A week after the students were exposed to the lesson package, a reshuffled BATBEC alone was administered to those in the control group under close supervision. Those in the experimental group had theirs sent to them online, which they responded via same medium. Back at their centres, FMEDEQ was administered to the experimental group in order to find out the possible problems they might have had in the course of them using the e-mail dialoguing approach. The whole procedure for data collection took six (6) weeks.

Data collected from FMEDEQ were analysed using weighted means. The item with a mean rating of 2.00 and above was considered accepted, while any item with mean rating below 2.00 was rejected. Also, data from BATBEC were analysed using means (X) and Standard Deviation (SD) to ascertain the effect of the treatment.

Results :Results obtained are presented below based on the research questions that guided the study.

Research Question 1:What is the effect of dialoguing through e-mail on performance of NTI science students in Biology?

Table 1: Pre and Post-tests Mean and Standard Deviation of dialoguing through e-mail on performance of NTI Science students in Biology

Group	n	Pretest		Posttest		Gain
		X	SD	X	SD	
Experimental	76	7.4	3.6	15.2	3.24	7.8
Control	26	5.6	3.8	9.7	3.3	4.1

N=102

Table 1 above reveals that dialoguing through e-mail led to the gain of 7.8 points by the experimental group against 4.1 by the control group. Consequently, dialoguing through e-mail leads to improved performance.

Research Question 2:How does gender of NTI science students affect performance when dialoguing through e-mail is used for instruction?

Table 2: Pre and Posttests Mean and Standard Deviation of Performance of NTI Science students in Biology by Gender.

Group	n	Pretest		Posttest		Gain
		X	SD	X	SD	
Experimental male	18	6.9	3.4	16.8	3.8	9.9
Control male	12	5.2	2.6	7.5	2.9	2.4
Experimental female	58	6.4	3.1	14.7	3.5	8.3
Control female	14	5.6	2.3	7.1	3.0	1.5

N=102

Table 2 above reveals that dialoguing through e-mail led to improved performance of both male and female NTI science students with male students achieving more (9.9 points) than female (8.3 points).

Research Question 3:What are the factors militating against effective dialoguing through e-mail in science instructional delivery?

Table 3: Mean ratings of the factors militating against effective dialoguing through e-mail

S/N	Possible factors that affect e-mail dialoguing	Total score	Mean score	Decision
1.	High Internet access charges	288	3.79	Accepted
2.	Fluctuation in Network access	290	2.90	Accepted
	Inconsistent power supply	304	4.00	Accepted
4.	Inadequate skill on how to operate the computer system	250	3.29	Accepted
5.	Some Modems select environments for Internet accessibility	180	2.36	Accepted
6.	Some files sent through e-mail are disorganized on arrival on the recipient’s mail box.	145	1.91	Rejected
7.	High cost of updating antivirus	158	2.08	Accepted
8.	Lack of relevant softwares to download e-mail attachments.	150	1.97	Rejected
9.	Crowd in some cyber cafés.	148	1.95	Rejected
10.	Slow rate of attached files to open	170	2.24	Accepted

Table 3 above reveals the factors that militate against effective dialoguing through e-mail amongst NTI NCE

Science students in AKS. The factors are: high Internet access charges; fluctuation in Network access; inconsistent power supply; inadequate skill on how to operate the computer system; selectivity of some modems to some environments for Internet accessibility; high cost of updating antivirus; and slow rate of attached files to open. However, disorganization of sent files in recipients' boxes; crowd in some cyber cafés; and lack of relevant softwares to download e-mail attachments did not militate against the use of e-mail dialoguing.

Discussion

The study, as indicated in table 1 revealed that NTI science students in AKS who dialogued through e-mail within themselves and their lecturers achieved better academic performance when compared with their counterparts who only relied on the programmed text given to them at their study centres. It is postulated that this gain in academic achievement is as a result of the extension of classroom activities/ discussion to the Internet environment. Dialoguing through e-mail was less intimidating as it took away the shyness and fear of possible scolding by lecturers away from the students prevalent in the face-face instructional setting. Students felt much more relaxed to dialogue or converse with their mates and teachers, get issues clarified and thus leading to a deeper understanding of taught concepts, which culminated into improved performance. This finding is in support of a study by Yu & Yu (2002), who investigated the impact of incorporating e-mail into a classroom setting on students' academic performance within two groups of students: the email diffusion group and the non-email diffusion group. Results showed that there was a statistically significant difference in their academic performances. The obtained result supported the hypothesis of that study which stated that email as a medium for classroom connection enhances students' performance.

Findings from research two revealed a difference in academic gains between the male and female students who utilized e-mail dialoguing, in favour of the males. The researchers of this study propose that the difference could be attributed to employment variables. From the interaction of the researchers with the NTI—NCE students in the course of this study, it was discovered that majority of the male students were either government or private employees, who were more likely to use e-mail for more hours because their working environments were more dynamic and flexible. The availability of Internet-connected computers in their work places placed them at advantage, because they must have had easy access and more time to go online compared to the female students who were majorly housewives, loaded with domestic chores. Some were even found to be nursing mothers without house helps and thus have little or no time at their disposal to sit on the computer, let alone have the skill to carry on much online instructional activities. Thus, the performance of male students wouldn't be anything short of what this study revealed. This finding buttresses the opinion of Brosnan & Davidson (1996) who viewed ICT-related activities, a male domain or something for boys. It further agrees with other research reviews (Reinen & Plomp, 1996; Volman & Eck, 2001), which revealed that boys were more interested in ICT than girls. They (boys) were heavier users of computers, have more positive attitudes about computers and consequently out-performed girls in their academics. The finding, however, is at variance with the assertion of King, Bond & Blandford, (2002) who stated that gender gaps related to ICT access diminished and do not have practical influence on performance of students.

Findings from research question three revealed that the major factors militating against effective e-mail dialoguing in science instructional delivery were: high Internet access charges; fluctuation in Network access; inconsistent power supply; inadequate skill on how to operate the computer system; selectivity of some modems to some environments for Internet accessibility; high cost of updating antivirus; and slow rate of attached files to open. This finding supports that of Obetta & Agboeze (2010), who carried out a study on "Integrating Information and Communication Technology (ICT) in Distance Education: A study of Institute of Management and Technology Programmes in Enugu". The researchers found that constant power failure, high Internet access charges, high rate of illiteracy and high cost of computer and telecommunication facilities were major factors that influenced integration of ICT in distance education programmes.

Conclusion

Based on the findings of this study, it was therefore concluded that distance teaching students who integrate Internet services, like dialoguing through e-mail, in their learning process perform better than their counterparts who only rely on programmed printed text materials. Also, male students of Distance Education programmes, specifically those of NTI in Akwa Ibom State are better users of ICT and Internet facilities in an instructional setting. Nevertheless, factors such as high Internet access charges; fluctuation in Network access; inconsistent power supply; inadequate skill on how to operate the computer system; selectivity of some modems to some environments for Internet accessibility; high cost of updating antivirus; and slow rate of attached files to open, militate against effective integration of e-mail dialoguing in distance learning programmes.

Recommendations

The following recommendations are made based on the findings of this study:

1. Lecturers and students of National Teachers' Institute (NTI) of Nigeria should integrate e-mail dialoguing in their instructional process in order to achieve better performance.
2. E-mail, being a technology yet to be implemented as an instructional tool by NTI in Akwa Ibom State, orientation sessions should be organized at close intervals by the Institute for both lecturers and students. During such orientations, holders of Master and Doctorate Degrees in Educational Technology should be invited as resource persons to sensitize them (lecturers and students) on how to use the e-mail services to derive its inherent instructional values.
3. NTI should install Internet connection at various study centres across the country. This will enable their instructors and students to have increased access to utilisation of its services for instruction.
4. Female NTI students should encourage themselves to meet up with the current Information and Communication Technology (ICT) challenges, by enrolling in private, institutionalized and work-place ICT trainings.
5. Improved modems that will be generally friendly to all environments should be produced by highly-skilled tele-communication technicians for easy accessibility of Internet.
6. Nigerian government should work in collaboration with non-governmental bodies and philanthropists to solve the problem of power supply.

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