

Extent of Utilisation of Educational Technologies in Support of Teaching and Learning by Lecturers of Federal Polytechnic, Bauchi

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Abstract

The study investigated the extent of utilisation of educational technologies in support of teaching and learning by lecturers of Federal Polytechnic, Bauchi. Educational technologies offer tremendous promise for teaching and learning, and has ignited the imagination of those who are interested in bringing about revolutionary gains in the achievement of all students. The study adopted a survey research design. The target population of this study was all the lecturers of Federal Polytechnic, Bauchi from which a total of 60 lecturers, conveniently sampled, was used for the study. A 26-item questionnaire which was validated by the project supervisor was used for the study. Data collected from the respondents were analyzed using mean and standard deviation. Three hypotheses were also tested. The result of the study revealed among others that lecturers of Federal Polytechnic, Bauchi use educational technologies. It was found that the lecturers use the web to look up reference information for study purposes, use word processors to prepare lecture materials, and use computer and mobile devices to access information/services on the internet. It was concluded that educational technologies are a potential in teaching and learning which facilitate content delivery and student's learning. The study recommended, among other things, that proper training or orientation on the use of new and emerging educational technologies should be conducted regularly.

Keywords: *Utilization, Educational technologies, Teaching, Learning, Lecturers*

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Background to the Study

Teaching and learning over the last twenty years emphasize student-centred pedagogy. There is an increased expectation placed onto the role that technology can play to harness effective learning. However, one could argue that there remains disconnect between our ambition for interactive learning through technology and the realities of our practice (Roblyer, McDaniel, Webb, Herman & Witty, 2010). As Kamnoetsin (2014) poignantly pointed out, today the people of the world live in a generation of continual digital revolution. People use Information and Communication Technologies (ICTs) and the Internet virtually every day. Technology plays an important role in people's lives especially today's lecturers and students. Technology has become routine among lecturers and students, permeating many aspects of their lives including learning. According to Speechley and Terry (2015), the traditional classroom is structured with lectures, academic reading materials, essays, and tests; however recent advances in pedagogy point towards a more effective learning environment when a variety of teaching methods are used. Education is a term that means many things to many people. According to Oxford English Dictionary (2000), the term education means “a process of teaching, training and learning, especially in schools or colleges to improve knowledge and develop skills”. There seems to be a consensus among definers of the term education. Education is regarded as “that which is given to an individual to make him develop socially, morally, and intellectually as to allow for his/her personal overall development and the development of the community in which he/she finds himself/herself”. Technology, on the other hand, according to University of Washington (n.d.) refers to advancements in the methods and tools we use to solve problems or achieve a goal. In the classroom, technology can encompass all kinds of tools from low-tech pencil, paper, and chalkboard, to the use of presentation software, or high-tech tablets, online collaboration and conferencing tools, and more. The newest technologies allow us to try things in physical and virtual classrooms that were not possible before. What you use depends fundamentally on what you are trying to accomplish. Teaching with technology can deepen student learning by supporting instructional objectives. However, it can be challenging to select the “best” tech tools while not losing sight of your goals for student learning. Once identified, integrating those tools can itself be a challenge albeit an eye-opening experience.

Therefore, Education Technology is an area of technology devoted to the development and application of tools (including software, hardware, and processes) intended to promote education. Put another way, educational technology is a study and ethical practice for facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources (Lazaro, 2014). It is, in the words of a Guest Writer (2014), the use of digital or electronic technologies and materials to support teaching and learning. Teaching is the process of attending to people's needs, experiences and feelings, and making specific interventions to help them learn particular things. Interventions commonly take the form of questioning, listening, giving information, explaining some phenomenon, demonstrating a skill or process, testing understanding and capacity, and facilitating learning activities (such as note taking, discussion, assignment writing, simulations and practice) (Smith, 2016). Tella, Bashorun and Adu (2012) posited that learning means “to gain knowledge or understanding of or skill by study, instruction or experience”. Utilisation

connotes the use of item, idea or object to solve an existing problem or to achieve an objective. To utilise according to Hawkins (2005) is to find a use for something. When items are utilised for any purpose, they result to phenomena. Utilisation, in the context of this study refers to the utilisation of educational technologies for teaching and learning purposes.

Educational technology plays an important role in supporting teaching and learning inside and outside the classroom. It can be used to encourage engagement, provide students with additional support/resources and enrich the classroom experience (Carleton University, n.d.). The use of educational technologies in teaching is not only a matter of convenience. In the introduction to his famous article Digital Natives, Digital Immigrants, Marc Prensky (2001) noted that students have changed radically. Today's students are no longer the people the educational system was designed to teach. Furthermore, Marc Prensky stated that because the single biggest problem facing education today is that Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language. Four years later Prensky (2005) suggested that students want and deserve to receive this content through 21st century tools that are powerful, programmable, and customizable - through tools that belong to them. This content could be offered to them on their cell phones, and other handy technologies. Web-based tools such as Edmodo, online libraries, Skype, Twitter etc, provide learners with new opportunities to become independent in their study and research. They encourage a wider range of expressive capacity (Crook, Fisher, Harrison, Logan, Luckin, Oliver, and Sharples, 2008).

When teachers learn to use a new technology in their classrooms, they model the learning process for students; at the same time, they gain new insights on teaching by watching their students learn. Moreover, the transfer of the teaching role from teacher to student often occurs spontaneously during efforts to use computers in classrooms (National Research Council, 2000). However, technology alone does not enhance learning, evaluations must also consider how programmes are designed and implemented, how teachers are supported, how communities are developed and how outcomes are measured (Power, 2014). This study thus seeks to know the extent at which lecturers of Federal Polytechnic, Bauchi utilise educational technologies – online and software tools, and hardware devices, to support teaching and learning.

Statement of the Problem

Today, we are living in a world of continual digital revolution where technologies have changed the way we teach and learn. It, therefore, becomes imperative for lecturers to adopt technology, to follow closely and to exhibit a positive attitude towards integration of technology in the classroom. In Nigerian institutions of higher learning like the Federal Polytechnic, Bauchi so much money is spent on the procurement of educational tools for instruction, but most of these gadgets are often found lying idle for several years unutilized.

Again, knowing that educational technologies offer tremendous promise for teaching and learning, and has ignited the imagination of those who are interested in bringing about revolutionary gains in the achievement of all students, there is lack of readiness on some

lecturers to explore the available educational technologies to maximize their potentials in facilitating teaching and learning. In some cases, these lecturers would oppose innovation and insist on maintaining the status quo due to their misconception of what educational technologies are. It is against this seeming low utilisation of educational technologies that this study is aimed at ascertaining the extent of utilisation of educational technologies in support of teaching and learning.

Objectives of the Study

This study is designed to examine the extent of utilisation of educational technologies in support of teaching and learning by lecturers of Federal Polytechnic, Bauchi. Specifically, the study is designed to:

1. Determine the extent to which lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning.
2. Verify the extent to which lecturers of Federal Polytechnic, Bauchi utilize software tools to support teaching and learning.
3. Ascertain the extent to which lecturers of Federal Polytechnic, Bauchi utilize hardware devices to support teaching and learning.

Study Questions

The study is guided by the following research questions:

1. To what extent do lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning?
2. To what extent do lecturers of Federal Polytechnic, Bauchi utilize software tools to support teaching and learning?
3. To what extent do lecturers of Federal Polytechnic, Bauchi utilize hardware devices to support teaching and learning?

Hypotheses

HO₁: There is no significant difference in the opinions of male and female lecturers on the utilization of educational technologies.

HO₂: There is no significant difference in the opinions of HND/BSc and Masters/PhD holders on the utilization of educational technologies.

HO₃: There is no significant difference in the opinions of young and aged lecturers on the utilization of educational technologies.

Significance of the Study

It is hoped that this study will be of immense relevance to lecturers, students and policy makers in the educational sector. To the lecturers it will help them appreciate the potentials of integrating educational technologies in teaching-learning process to facilitate content delivery and support student learning. The study is also expected to expose students to educational technologies they could harness to their learning advantage. For policy makers in the educational sector, it will guide them in decision-making that relates to education.

Scope of the Study

This study is limited to Federal Polytechnic, Bauchi. Federal Polytechnic, Bauchi is located in Gwallameji, Bauchi along Dass/Tafawa-Balewa Road.

Literature Review and Methodology

Review of Literature

Conceptual Framework

Technology is most often used today to mean a device. In Education today most people think of technology almost exclusively as the computer. But technology could be any tool that can be used to help promote human learning including video cameras, digital cameras, MP3 players, Portable Digital Assistants, and, of course, the computer. But in the field of Educational Technology we embrace the original definition of technology to mean not only devices (we do love things that plug in), but also processes and strategies as well (Jones, 2005). Mishra, Koehler, and Kereluik (2009), define educational technology as the study and practice of facilitating learning and improving performance by creating, using and managing technological processes and resources. The universally accepted definition of educational technology according to National Council of Educational Research and Training (2006), involves processes, methods and techniques, products, resources and technologies organized into workable systems. The recognition of the need for a multilevel organisation of a classroom, for instance, along with the designing of an appropriate programme and its implementation, become as much an exercise in educational technology as the use of audio-visual aids or the information superhighway. However, National Teachers Institute (2017) refers to it as hardware and software, including television, radio, electronic classroom, instructional devices, still and motion picture projectors, computer-assisted or managed instructional equipment and materials, communications equipment for educational application, and other equipment and materials necessary to assist the process of learning.

Teaching as a term, has a long history of usage. Surprisingly, the term has been erroneously misunderstood to mean an act by anybody who is assumed to be knowledgeable to disseminate information to others. It is this wrong interpretation of the term that has led to the appointment of many unprofessionally qualified people performing the task of teaching. Teaching is a serious business. It is very tasking and highly demanding. It is an art of passing knowledge by way of deliberate arrangement of the task to be learnt, the method(s) to be adopted, the material(s) to be used, the learners, the evaluation as well as the entire teaching-learning environment in a manner that will provide learning arising from the interactions. Teaching is expected to produce learning. Therefore, any teaching activity which fails to produce the desired outcome (learning) is not to be taken as teaching. Mind you, there could be reasons or several factors that may inhibit learning to occur even when adequate preparation is made for a lesson, but if the lesson fails to lead to learning on the part of the learner(s), no other word would describe the titration better than to say learning has not occurred (National Open University of Nigeria, 2017).

On the other hand, learning is a relatively permanent change in human behaviour arising from experience. The expression “relatively permanent” is used to connote the expectation of the time lag of change in behaviour. The change is expected to be noticed in the person that has

acquired the new knowledge for a very long period. It should be part and parcel of him until and unless the acquired knowledge/skill becomes rather obsolete, archaic, and therefore no longer relevant. The term “behaviour” is indicating where to measure the acquisition of the new knowledge. We are not interested in the physical change but in attitudinal change. Again, the change in behaviour should be an outcome of the learner's interaction with the environment rather than an outcome of natural biological changes such as maturations, growth and development. For learning to take place, learning environment must be sufficiently made conducive. It must be rich in resources as to provide learning experiences needed by the learner for the expected learning outcomes. The use of different forms of media ranging from audio to visual, audiovisual, model, mock-ups, graphics, projected, non-projected, and realia (real objects) will encourage enabling environment and experiences that can promote learning (NOUN, 2017).

Technology ushers in fundamental structural changes that can be integral to achieving significant improvements in productivity. Used to support both teaching and learning, technology infuses classrooms with digital learning tools, such as computers and hand held devices; expands course offerings, experiences, and learning materials; supports learning 24 hours a day, 7 days a week; builds 21st century skills; increases student engagement and motivation; and accelerates learning. Technology also has the power to transform teaching by ushering in a new model of connected teaching. This model links teacher to their students and to professional content, resources, and systems to help them improve their own instruction and personalize learning. Online learning opportunities and the use of open educational resources and other technologies can increase educational productivity by accelerating the rate of learning; reducing costs associated with instructional materials or programme delivery; and better utilizing teacher time (U.S. Department of Education, n.d.).

Educational Technologies for Teaching and Learning

Olayiwola (2016) posited that there are several technologies nowadays used for teaching and learning within and outside the classroom system. The use of Information and Communication Technology (ICT) such as internet applications, CD-ROMs, video technology and various computer attachments and software programmes for teaching and learning are enormous. Further, Olayiwola classified these educational technologies for teaching and learning into (i) Web-based/Online tools (ii) Software tools, and (iii) Hardware devices.

Online Tools

There are several online pages, programmes, and application that are used in contemporary society to facilitate teaching and learning. This among others is one of the benefits the worldwide internet has brought to our educational system. Students no longer need to be limited to classroom instructions or teacher's text alone to understand a concept or facilitate his/her learning. These online tools have opened up opportunities for both students and teachers to access a wide range of information in any discipline across the globe. Some of these tools are even used to facilitate learning and promote further instruction outside the four walls of the classroom. Few of these online tools that are mostly used are described below:

- i. **Clever:** Clever streamlines the process of logging into educational apps by letting students log into all of their tools with a single set of credentials. It is designed to suit mostly primary and secondary school teachers and students. Each school registers with Clever and subscribes to any of the applications. These applications will be made available to each student and teacher that login through their school access. It connects applications with the Student Information Systems (SIS) already in place for schools.
- ii. **Edmodo:** This is an online classroom designed like a social media platform for teachers, students, and parents. It allows teachers to assign and grade homework on their mobile devices. It allows students to connect with educators and classmates, and parents to stay up-to-date on what their children are doing at school. Edmodo is effective for virtually all classroom activities and can be used at all levels of education. Teachers can use it to make the grading process easier, to assess students' performance, or to complement their lesson plans. Students can engage with learning material in a variety of ways, and they can also participate in online discussions with their classmates or other learners around the world. By making classwork easily available and offering access to resources, learners, and educators around the world, Edmodo provides a comprehensive setting for the online education experience and ensures that students remain safe and focused.
- iii. **Kahoot:** This is a user-friendly tool for designing in-class questionnaires and quizzes. The teacher designs a quiz, survey, or questionnaire to test the knowledge of the students on the curriculum contents. Students can answer questions using a variety of devices. The quizzes and questionnaires, referred to as 'Kahoots', are designed to promote a game-like atmosphere in the learning environment.
- iv. **Schoology:** It is a learning management system to facilitate the creation of class rosters, curricula, and calendars. It also keeps track of interactions among students and student assessment results, among other things. It can be used at all levels of education.
- v. **Skype:** It is an online video-calling tool that allows users across the world to communicate for free, via the Internet. 'Skype in the classroom programme' is an application from skype that helps teachers expand their curricula beyond their schools. The 'International classroom' is becoming an increasingly important concept in education, and Skype makes it easy to connect people around the world.
- vi. **Desmos:** This is an incredibly fast online calculator that can graph any imaginable function. It also allows users to add sliders, do regressions, and plot whole data tables, among other things. It can be used on any computer or tablet, completely free of charge, and does not even require a download. It seamlessly creates a beautiful visual representations and animations, and it allows users to save and share graphs they have created. It makes complex math – whether theoretical or applied – fun, interactive, and accessible.
- vii. **Google Knowledge Graph:** It is an enhanced way of using the standard search bar. In essence, Google Knowledge Graph consists of those short, accurate answers you see when you ask a question in Google search. Rather than dig through websites to find the distance to the moon in miles (for instance). Google knowledge Graph quickly answers your query and suggests resources for further investigation.

- viii. **Duolingo:** This is a language-learning app and website that features comprehensive guides for nine of the most commonly taught languages in the U.S., including Spanish, French and German.
- ix. **Coursera:** It is an online knowledge base that works with world-renowned universities such as Harvard Universities to give users access to free online courses. Student can learn at his/her own pace and receive certificates as they complete courses. Coursera provides a comprehensive selection of high-quality courses online.
- x. **Course management tools** such as Canvas allow instructors to organize all the resources students need for a class (e.g. syllabi, assignments, readings, online quizzes), provide valuable grading tools, and create spaces for discussion, document sharing, and video and audio commentary. All courses are automatically given a Canvas site.
- xi. **Lecture-capture tools** such as Panoptic, allow instructors to record lectures directly from their computer, without elaborate or additional classroom equipment. Consider recording lecturers and then uploading them for students to re-watch. Studies show that posting recorded lectures does not diminish attendance and students really appreciate the opportunity to review lectures at their own pace (Centre for teaching and learning).
- xii. **Other online collaboration tools** such as those in Google Apps. Google Classroom allows students and instructors to share documents online, edit them in real time and project them on a screen. This gives students a collaborative platform in which to brainstorm ideas and document their work using text and images.

Software Tools

Apart from the online tools that are used for facilitating teaching and learning, there are other software tools that do not require the use of internet. Both teachers and students can explore these applications to facilitate learning. These software tools vary from one discipline to another. Some of these include: Learning Suite by Microsoft, Microsoft Flashcards, Office 365 for education, Microsoft Mathematics 4.0, Microsoft Encarta, Microsoft Digital Literacy Curriculum, etc. Presentation software such as PowerPoint enable instructors to embed high-resolution photographs, diagrams, videos and sound files to augment text and verbal lecture content.

Hardware Tools

These are physical tools used to facilitate teaching and learning. It includes computer devices, tables, ipad, interactive board, white board, etc. Some of these hardware tools can be used with any of the software tools to create an interactive learning experience. For instance, tablets can be linked to computers, projectors and the cloud so that students and instructors can communicate through text, drawings and diagrams.

Roles of Educational Technology in Formal and Non-Formal Settings

National Teachers' Institute (2017) opined that educational technology, when wisely and judiciously applied can perform the following functions:

1. It makes learning to become more concrete, real, immediate and permanent. For example, videos, films, pictures, television and the radio can bring to learners, different animals, places, people and events in their physical, natural context from the real world outside into the classroom.

2. It makes instruction more scientific and systematic. Teaching and learning are targeted at measurable objectives and based on well researched learning theories.
3. It makes education to become more productive. Learners can learn with speed and accuracy. Teachers can do more creative work by allowing technology to handle routine jobs of information transmission and heavy burden of administrative tasks such as marking, recording, etc.
4. It helps to individualize instruction as the different learning needs of students can be met and catered for. Each learner can go at his own pace and time.
5. Similarly, it gives equal access to education. With the internet, for example, it is easy to gain access to the best libraries in the world.
6. It provides the teachers with the means of arousing and sustaining the interest of learners as well as promoting positive attitude to learning. The teacher is able to vary his mode of instruction using various devices. Use of instructional media helps to generate interest.
7. It promotes self-instruction. Self-instructional materials, for example, are a product of education technology.
8. It promotes retention as the object being learnt can be seen, smelt, tasted, touched, felt or heard by the learner. A learner, for example, that engages in the dissection of a specimen is more likely to retain and recall the essential internal features of the specimen than one who simply listened to the lecture.

Constraints of Effective Practice of Educational Technology

The following, as identified by NTI (2017), are the problems to effective practice of Educational Technology:

- a. Bureaucratic bottlenecks and rigid organizational structure that oppose innovation and insist on maintaining the status quo.
- b. Poor reward system that does not recognize or promote the use of innovative techniques of education technology.
- c. Lack of professionally or academically trained personnel in educational technology limits the practice of the field.
- d. Poor funding and allocation for educational technology at the various levels of the educational system (primary, secondary and tertiary) leads to inadequate supply of facilities, equipment and materials. No wonder, most of our schools are ill-equipped, if at all.
- e. Closely related to poor financial allocation or provision for educational technology is the issue of lack of space and instructional resources in Nigerian schools and colleges. Most classrooms, lecture halls and auditoria are not designed or adapted to accommodate audio-visual devices.
- f. Educational Technology Centres are non-existent in most schools and colleges, higher institutions and at the national, state and local government levels.
- g. Irregular power supply
- h. Teaching load that leaves the teacher with little or no time to adopt and use educational technology tools and techniques.
- i. Lack of relevant educational media in majority of subject areas.

- j. The Nigerian educational system places much emphasis on examinations and certification thereby limiting the extent to which Educational Technology tools and techniques can be used in the instructional process.
- k. Lack of professionalization of educational technology in Nigeria is a major constraint.
- l. Maintenance problems exist. Also, there is lack of spare parts.

Related Empirical Studies

Some related empirical studies that have some relationship with the present study are discussed as follows:

Opinions of Males and Females on Utilization of Technologies

In a study conducted by Anaza (2018) on “lecturers' attitude toward mobile technology utilisation for instructional purposes in colleges of education in North Central, Nigeria.” The results showed that there was a significant difference among the lecturers' attitudes towards the mobile technology utilization for instructional purposes attributed to gender. The result was attributed to the attitudes of male and female lecturers towards the mobile technology. Besides, the general characteristics of males and females and the different cultural, social and economic contexts in which they live, reflecting divergent views of both males and females towards the mobile technology use for instruction in colleges of education reveals that there was a significant difference in the attitude of male and female lecturers toward mobile technology utilization for instructional purposes in colleges of education.

However, in a study that was carried out in Ignatius Ajuru University of Education and Rivers State University of Science and Technology by Nwankoala (2015), aimed at finding out the perceptions of lecturers' and students' on use of ICTs in university teaching and learning in these Universities. On the extent to which gender of lecturers affect their usage of ICT in university education in Nigeria, the study revealed that gender of lecturers has no significant influence on their use of ICT in universities ($t=1.300$, $p=0.177$). In other words, the study indicated that the gender of lecturers did not predict their usage of ICT in university education. Additionally, on the contribution of lecturers and students' usage of ICT in university education to national development it was found that university lecturers and students use of the ICT highly contributed to both their human capacity development and national development.

Akpan (2014) investigated the influence of ICT competence on lecturers' Job Efficacy in two Nigerian universities. Two hypotheses were formulated to guide the study. The sample of the study consisted of 500 university teachers randomly sampled from a population of 1,795 teachers. Data for the study were collected using ICT Competence and Job Efficacy Questionnaire (ICTCJEQ). The data were analyzed using Chi-square and One-way Analysis of Variance (ANOVA) statistical techniques. The results of the study revealed that male and female lecturers did not differ significantly in their level of ICT competence. Lecturers with high ICT competence were found to be more efficacious in classroom instruction, research/publication, communication and recordkeeping than those with moderate and low ICT competence. The findings of this study revealed that the level of ICT competence of

lecturers significantly enhanced their job efficacy. Premised on these findings, it was recommended that lecturers should be well motivated to develop their ICT competence as this has been found to improve job efficacy for high productivity. University management should encourage lecturers to participate in ICT training programs and ICT facilities should be provided in lecturers' offices to enhance their job efficacy.

Kpolovie, and Awusaku (2016) conducted a study on ICT adoption attitude of lecturers. The study investigated the attitude of lecturers towards the adoption of Information and Communication Technology, in teaching and research in federal and state-owned universities in Nigeria. Four research questions and null hypotheses were respectively, answered and tested. A stratified sample of 400 lecturers (251 males and 149 females) was randomly drawn from one federal university and one state university. Results revealed that gender and area of specialization have no significant difference in the attitude of lecturers towards ICT adoption in teaching and research.

Opinions of Young and Aged Lecturers on Utilization of Technologies

In a related study conducted by Saleh and Sa'ad (2013) on the “impact of teachers' age, gender and experience on the use of information and communication technology in EFL teaching”, the study which examined among others whether young teachers and old teachers differ in their uses of ICT in their instruction. The result revealed that most of the teachers in both groups had their own personal computers, and they could access the internet at home. However, the teachers in the second group (41-60) reported that they could access the internet in their offices more than the teachers in the first group. Regarding using ICT in their teaching, more teachers in the second group (89.5%) had used ICT in their teaching, whereas 70.4% of the teachers in the first group had used ICT in their teaching. However, the total number of the teachers who had used ICT in their instruction in both groups is similar (i.e. 19 and 17) which means that there is no significant difference between the two groups regarding the uses of ICT in English language teaching. Many of the respondents in both groups did not attend any training course in ICT.

Regarding reading about ICT and its uses in language teaching, 55.6% of the respondents in the first group had read materials about ICT and its application in language teaching and learning, whereas 42.1% of the teachers in the second group had not read materials about ICT and its application in language teaching and learning. T-test results indicated that there was no significant difference between the two groups regarding the integration of ICT in language learning.

Similarly, the results obtained from the interview indicated that most of the teachers felt that the age of the teacher had nothing to do with the integration of ICT in language teaching. Only one teacher stated that the age had an impact on the integration of ICT into language teaching. She stated that "young teachers are more enthusiastic and more energetic than senior ones". These findings contrast with those from some previous studies relating to the impact of teachers' age on ICT integration (e.g., Teo, 2008; Yaghi, 2001). These studies have found older teachers to be less confident with using computers. Lee (1997) as cited in British

Educational Communications and Technology Agency (2004) pointed out that many teachers of 'advanced age' will not have any computer education when in college, and as a result are in need of computer skills training to allow them to make use of computers in their work. Teo (2008) found that Singaporean pre-service teachers' attitudes for computer use were influenced by their age. Yaghi (2001) found that older teachers were less confident with using computers. In sum, the teacher's age had no effect on the implementation of ICT in language learning. Though, it may have indirect effect regarding the teaching experience. In other words, young teachers may have less teaching experience than senior teachers.

Opinions of HND/BSC and Master's/Ph.D. on Utilization of Technologies

Dalshad (2017) conducted a study on the "E-learning competencies of the Lecturers at Koya University and its relationship with some variables (field research). In answering the research question: Are the e-learning competencies changed according to categories of Academic Degree among Koya University lecturers? The research question was tested by using technique Independent Samples t-Test, and found the mean of the PhD which was 122.82, whilst the standard deviation was 24.56, the mean of the MSc was 127.2, whilst the standard deviation was 26.55, the degree of freedom was 118, the value of (t) was .919, which was not statistically significant at the level 0.05. Moreover, the study revealed that there was no significant differences between Koya University lecturers according to their academic ranks (Professors, Assistant Professors, Lecturer, and Assistant Lecturer) at their e-learning competence at level of 0.05. This result might be due to that teachers with academic rank holds (Professor and Associate Professor) have been able to control the competencies of e-learning, however, holders of the new academic rank (lecturer and assistant lecturer) also have been able to control the competencies of e-learning because the majority of them have completed their studies at universities in foreign countries, and there have been forced to mastery of competencies of e-learning. The findings of this study provide evidence of lecturer's e-learning competencies at Koya University, and contribute to our understanding of the ability and the willingness of lecturers at Koya University in their use of e-learning, which showed to be in a good level. The findings of this study provided evidence of lecturer's e-learning competencies at Koya University, and contributed to understanding of the ability and the willingness of lecturers at Koya University in their use of e-learning, which showed to be in a good level.

Historical Background of the Federal Polytechnic, Bauchi

The Federal Polytechnic, Bauchi is one of the seven Polytechnics established by the Federal Government of Nigeria under Decree Number 33 of 1979. The Decree stipulated the functions of the Polytechnic to be as follows:

1. To provide full time or part time courses and the training in technology, applied science, commerce, management and in such other field of applied learning relevant to the need of the development of Nigeria in the areas of industrial and agricultural production and distribution of research in the development and adaptation of techniques as the Council may from time to time determine;
2. To arrange conferences, seminars and study group relative to the field of learning specified above;

3. To perform other functions as in the opinion of the Council may serve to promote the objectives of the Polytechnic.

Although, work started on skeletal basis in May, 1979, the Polytechnic academic activities actually took off on 22nd November, 1979 with an initial students' population of 245 registered in 11 Departments. Apart from those admitted for the introductory course, all other students were admitted for the 4-year Nigerian National Diploma (NND) programme.

The Polytechnic started with initial staff strength of 138 comprising of 45 and 93 Senior and junior staff respectively with Engr. M. O. Anyiam as the pioneer Rector. The Polytechnic Administrative Department was housed in two buildings along Yandoka Road Bauchi, while a part of the Bauchi Teacher's College was offered by the Bauchi State Government for use of the Polytechnic as students' hostels, cafeterias, lecture rooms, typing classes, library and medical centre. In 1980, when the Bauchi State Government decided to establish an Advanced Teachers' College now (College of Education) in Bauchi metropolis, the Polytechnic moved out of Bauchi Teachers' College for the new Institution. Consequently, some houses were rented along Ran Road, Bauchi and used for academic activities. Some other rented buildings were used as female hostels in Yelwa village, while male hostels were located along Maiduguri Road, near Gubi Dam road junction.

The Polytechnic has continued to grow in population and a number of programmes offered. For instance, there are now five (6) Schools with more than twenty-two (22) Academic Departments and several Introductory and Certificate courses of one-year duration in addition to National and Higher National Diploma run for the period of two years each. Currently, the Institution has staff strength of 1097 comprising both Senior (483 academic and 338 non-academics) and 276 junior staff.

Methodology

A descriptive survey research design was adopted for the study. The target population for the study was 483 lecturers of Federal Polytechnic, Bauchi. A total of 50 lecturers consisting 10% of the population was sampled for the study using a convenience random sampling method. The instrument for the data collection was a 26-item questionnaire. The questionnaire was divided into two sections. Section A of the questionnaire elicited information on demographic data, while section B sought information on the extent of the utilisation of educational technologies in support of teaching and learning by lecturers of Federal Polytechnic, Bauchi. A five-point rating scale was used. The questionnaire was face-validated by an expert. Fifty (60) questionnaires were administered on the respondents and 53 copies were retrieved and analysed using mean, standard deviation and t-test for testing the hypotheses. Boundary limit of 1.00 – 1.49; 1.50 – 2.49; 2.50 – 3.49; 3.50 – 4.49 and 4.50 – 5.00 were used to interpret the results as Very Low Extent (VLE); Low Extent (LE); Moderate Extent (ME); High Extent (HE) and Very High Extent (VHE) respectively. The hypothesis of no significant difference was accepted for items whose t-calculated (t-cal) were less than 1.96 at 0.05 level of significance. On the other hand, the hypothesis of no significant difference was rejected for items whose t-calculated (t-cal) were greater than 1.96 at 0.05 level of significance.

Discussion

Results

The results for this study were obtained based on the research questions answered and hypotheses tested. Both the research questions and the hypotheses are presented in tables 1, 2 and 3 as follows:

Research Question One: To what extent do lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning?

HO₁: There is no significant difference in the opinions of male and female lecturers on the utilization of web-based/online tools to support teaching and learning.

Table 1: Mean ratings and t-test statistics of the responses of male and female lecturers of Federal Polytechnic, Bauchi on the extent to which lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning.

(N=53)

S/NO	Variables	X _M	X _F	X _G	SD	t-cal	Remarks	
							RQ	H0
1.	Use the internet to access scholarly works such as e-journals, e-zines, eBooks and articles etc.	3.59	4.33	3.66	1.15	-1.49	HE	NS
2.	Communicate with students on academic matters	3.63	3.67	3.62	1.07	-0.07	HE	NS
3.	Take online courses (e.g. Coursera)	2.39	3.00	2.45	1.13	-1.23	LE	NS
4.	Collaborate with experts in my field around the world	3.04	3.33	3.08	1.20	-0.54	ME	NS
5.	Use the web to download lecture materials	3.70	4.17	3.75	1.20	-0.88	HE	NS
6.	Administer tests online	1.76	1.83	1.75	1.14	-0.14	LE	NS
7.	Access course or learning management systems (e.g. Canvas)	2.61	3.17	2.68	0.97	-1.31	ME	NS
8.	Use the email to send or receive assignments to and from students	2.89	3.50	2.96	1.44	-0.96	ME	NS
9.	Deliver lecture and content (e.g. Skype, Facebook)	1.89	2.50	1.94	1.08	-1.30	LE	NS
10.	Use the web to look up reference information for study purposes (e.g. online dictionaries)	3.61	3.83	3.64	1.09	-0.46	HE	NS

X_M = Mean of Male, X_F = Mean of Female, X_G = Overall Grand Mean; HE = High Extent, LE = Low Extent, ME = Moderate Extent; t-table (t-tab) = 1.96; Level of Sig. = 0.05; NS = Not Significant.

From the data presented in table 1, it revealed that the grand mean ratings of the responses of the respondents on 3 out of the 10 items in the table ranged between 1.75 to 2.45 which were within the boundary limit of 1.50-2.49 on 5-point rating scale revealing that lecturers of Federal Polytechnic, Bauchi are to a low extent utilizing web-based/online tools for the identified 3 items. The mean ratings of the respondents on items 4, 7, and 8 were 3.08, 2.68,

and 2.96 respectively which were within the boundary limit of 2.50-3.49 on 5-point rating scale indicating that the lecturers of Federal Polytechnic, Bauchi are to a moderate extent utilizing web-based/online tools to support teaching and learning on the identified 3 items. The data also revealed the grand mean ratings of the responses of the respondents on 4 out of the 10 items in the table ranged between 3.62 to 3.75 which were within the boundary limit of 3.50-4.49 on 5-point rating scale showing that the lecturers of Federal Polytechnic, Bauchi are to a high extent utilizing web-based/online tools for the identified 4 items.

The data presented in Table 1 on hypothesis one showed that the t-calculated (t-cal) values of all the 10 items in the table ranged between -1.49 to -0.07 which are less than the table (t-tab) value of 1.96 at 0.05 level of significance and 51 degree of freedom (df). This implied that there are no significant differences in the mean ratings of the responses of male and female lecturers on the 10 items of web-based/online tools usage in the table. Therefore, the null hypothesis of no significant difference in the responses of the two groups of respondents was accepted on the 10 items.

Research Question Two: To what extent do lecturers of Federal Polytechnic, Bauchi utilize software tools to support teaching and learning?

HO₂: There is no significant difference in the opinions of HND/BSc and Masters/PhD holders on the utilization of software tools to support teaching and learning.

Table 2: Mean ratings and t-test statistics of the responses of lecturers of Federal Polytechnic Bauchi with HND/BSc and MSc/PhD on the extent to which lecturers of Federal Polytechnic, Bauchi utilize software tools to support teaching and learning.

(N=53)

S/NO	Variables	$X_{H/B}$	$X_{M/P}$	X_G	SD	t-cal	Remarks	
							RQ	H0
1.	Use presentation software to prepare conference and lecture presentations (e.g. PowerPoint)	3.38	3.63	3.53	1.20	-0.68	HE	NS
2.	Use mathematical software such as SPSS for mathematical and scientific computations.	2.77	3.42	3.09	1.29	-1.76	ME	NS
3.	Use word processors to prepare lecture materials (e.g. Microsoft Word)	3.85	3.92	3.91	1.21	-0.20	HE	NS
4.	Use audio/video editing software to augment text and verbal lecture content (e.g. Audacity, Imovie)	2.12	2.63	2.36	1.25	-1.42	LE	NS
5.	Compute students result (e.g. Spreadsheet)	3.81	4.04	3.94	1.21	-0.66	HE	NS
6.	Use educational software for teaching and self-learning	3.00	2.92	3.00	1.12	0.25	ME	NS
7.	Use database software to keep my students' academic information	3.08	2.92	3.04	1.30	0.42	ME	NS

$X_{H/B}$ = Mean of HND/BSc, $X_{M/P}$ = Mean of Masters/PhD, X_G = Overall Grand Mean; HE = High Extent, LE = Low Extent, ME = Moderate Extent; t-table (t-tab) = 1.96; Level of Sig. = 0.05; NS = Not Significant.

From the data presented in Table 2 showed the grand mean ratings of the responses of the respondents on 1 out of the 7 items in the table with a value of 2.36 which was within the boundary limit of 1.50-2.49 on 5-point rating scale. This indicated that lecturers of Federal Polytechnic, Bauchi are to a low extent utilizing software tools for the identified 1 item. The mean ratings of the respondents on items 12, 16, and 17 were 3.09, 3.00, and 3.04 respectively which were within the boundary limit of 2.50-3.49 on 5-point rating scale indicating that the lecturers of Federal Polytechnic, Bauchi are to a moderate extent utilizing software tools to support teaching and learning on the identified 3 items. The data also revealed the grand mean ratings of the responses of the respondents on 3 out of the 7 items in the table ranging between 3.53 to 3.94 which were within the boundary limit of 3.50-4.49 on 5-point rating scale showing that the lecturers of Federal Polytechnic, Bauchi are to a high extent utilizing software tools for the identified 3 items.

The data presented in Table 2 on hypothesis two showed that the t-calculated (t-cal) values of all the 7 items in the table ranged between -1.76 to 0.42 which are less than the table (t-tab) value of 1.96 at 0.05 level of significance and 51 degree of freedom (df). This implied that

there are no significant differences in the mean ratings of the responses of lecturers of Federal Polytechnic, Bauchi with HND/BSc and Masters/PhD on the 7 items of software tools usage in the table. Therefore, the null hypothesis of no significant difference in the responses of the two groups of respondents was accepted on the 7 items.

Research Question Three: To what extent do lecturers of Federal Polytechnic, Bauchi utilize hardware devices to support teaching and learning?

HO₃: There is no significant difference in the opinions of young and aged lecturers on the utilization of hardware devices to support teaching and learning.

Table 3: Mean ratings and t-test statistics of the responses of young and aged lecturers of Federal Polytechnic Bauchi on the extent to which lecturers of Federal Polytechnic, Bauchi utilize hardware devices to support teaching and learning.

(N=53)

S/NO	Variables	X _{Yg}	X _{Ag}	X _G	SD	t-cal	Remarks	
							RQ	H0
1.	Use computer to create interactive learning experience	3.33	2.82	2.92	1.17	1.31	ME	NS
2.	Use hardware tools to communicate through text, drawings and diagrams with students.	3.17	3.05	3.08	1.17	0.28	ME	NS
3.	Use computer for writing documents such as lecture materials	4.50	3.61	3.83	1.17	2.37	HE	S*
4.	Use printers to print lecture handouts	4.67	3.79	4.02	1.04	2.62	HE	S*
5.	Use projector to deliver lecture content to students	3.17	2.71	2.83	1.39	0.95	ME	NS
6.	Use handheld devices (e.g. tablet, iPad) as personal organizer (e.g. diary, address book)	3.17	2.95	2.96	1.34	0.48	ME	NS
7.	Use computer and mobile devices to access information/services on the internet	4.67	3.61	3.87	1.19	2.82	HE	S*
8.	Use computer for general study, without accessing the web	3.75	3.42	3.47	1.18	0.85	HE	NS
9.	Use the computer for creating and editing multimedia lecture contents	3.08	2.97	3.02	1.26	0.25	ME	NS

X_{Yg} = Mean of Young, X_{Ag} = Mean of Aged, X_G = Overall Grand Mean; HE = High Extent, ME = Moderate Extent; t-table (t-tab) = 1.96; Level of Sig. = 0.05; S* = Significant; NS = Not Significant.

From the data presented in Table 3 showed the grand mean ratings of the responses of the respondents on 6 out of the 9 items in the table ranged between 2.83 to 3.47 which were within the boundary limit of 2.50-3.49 on 5-point rating scale. This indicated that lecturers of Federal Polytechnic, Bauchi are to a moderate extent utilizing hardware devices for the identified 6 items. The grand mean ratings of the responses of the respondents on 3 out of the 9 items in

the table ranged between 3.83 to 4.02 which were within the boundary limit of 3.50-4.49 on 5-point rating scale showed that the lecturers of Federal Polytechnic, Bauchi are to a high extent utilizing hardware devices for the identified 3 items.

The data presented in Table 3 on hypothesis three showed that the t-calculated (t-cal) values of 6 out of the 9 items in the table ranged between 0.25 to 1.31 which are less than the table (t-tab) value of 1.96 at 0.05 level of significance and 51 degree of freedom (df). This implied that there are no significant differences in the mean ratings of the responses of young and aged lecturers on the 6 items of hardware devices usage. Therefore, the null hypothesis of no significant difference in the responses of the two groups of respondents was accepted on the 6 items. The t-calculated (t-cal) values of the remaining 3 items in the table, specifically, items 20, 21, and 24 were 2.37, 2.62, and 2.82 respectively which are greater than t-table (t-tab) value of 1.96 at 0.05 level of significance and 51 degree of freedom (df) indicated that there are significant differences in the mean ratings of the responses of young and aged lecturers on the 3 items of hardware devices usage. Therefore, the null hypothesis of no significant difference in the responses of the two groups of respondents was rejected on the 3 items.

Discussion of Findings

The findings from table 1 shows that male and female lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning. Out of the 10 variables, the respondents rated four variables as high extent, 3 were rated moderate extend and the other 3 variables were rated low extent. This goes with Crook, Fisher, Harrison, Logan, Luckin, Oliver, and Sharples (2008) who stated that web-based tools such as Edmodo, online libraries, Skype, Twitter etc, provide learners with new opportunities to become independent in their study and research. The result in table 2 revealed that HND/BSc and Masters/PhD holders of Feral Polytechnic, Bauchi lecturers utilize software tools to support teaching and learning. The respondents rated 3 variables as to a high extent, 3 to moderate extent and 1 to a low extent. Table 3, revealed that young and aged lecturers utilize hardware devices to support teaching and learning. The respondents rated 3 variables as to high extent whereas 6 variables were rated as to moderate extent. This is in agreement with Olayiwola (2016) who opined that hardware tools can be used with any of the software tools to create an interactive learning experience.

Summary, Conclusion and Recommendations

Summary

From the findings it showed that lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning in that it, among other things, use the online tools to communicate with students on academic matters, download lecture materials, send or receive assignments to and from students and look up reference information for study purposes. Also, it was found out that the lecturers of Federal Polytechnic, Bauchi utilize software tools to among other things to prepare conference and lecture presentations, prepare lecture materials, and compute students result. In addition to these, it was discovered that the lecturers utilize hardware devices, for example, computer for writing documents such as lecture materials; printers to print lecture handouts and computer or mobile devices to access information/services on the internet.

Conclusion

This study examined the extent of utilisation of educational technologies in support of teaching and learning by lecturers of Federal Polytechnic, Bauchi. The result of the study revealed among others that the lecturers of Federal Polytechnic, Bauchi use educational technologies. It was found out that the lecturers use the web to look up reference information for study purposes, use word processors to prepare lecture materials, and use computer and mobile devices to access information/services on the internet. Based on these results, it is concluded that educational technologies are ubiquitous and useful tools for enhancing teaching and learning with accompanying benefits to both the lecturers and the students.

Recommendations

Based on the findings revealed in this study, it is recommended that:

1. Proper training or orientation on the use of new and emerging educational technologies should be conducted regularly.
2. Management should formulate the institutional policy on the use of educational technologies in content delivery and student learning.
3. School management should be encouraged to acquire big bandwidth for improved educational technology services.
4. Lecturers should be encouraged to develop the culture of maintenance of available educational technology facilities.
5. Educational Technology Centre should be established in the Polytechnic.
6. School management should provide adequate power supply to ensure that the available educational technology facilities are effectively put in use.
7. The educational technology components of the curriculum should be regularly updated in-line with emerging trends.

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APPENDIX

QUESTIONNAIRE ON LECTURERS' UTILISATION OF EDUCATIONAL TECHNOLOGIES IN SUPPORT OF TEACHING AND LEARNING

SECTION A

This part contains items to obtain information about your personal profile. Please you are required to indicate the option that applies to you by checking on the appropriate box.

Gender: Male [] Female []

Qualification: HND/BSc [] Masters/PhD []

Age: _____

Department/Faculty: _____

Years of Experience: _____

SECTION B

This part has a total of twenty-six items. As a lecturer of this polytechnic, please you are required to check on the appropriate column, the one that best describes the extent to which you utilize educational technologies. Use the following rating scale:

Very High Extent (VHE)	5
High Extent (HE)	4
Moderate Extent (ME)	3
Low Extent (LE)	2
Very Low Extent (VLE)	1

Research Question One: To what extent do lecturers of Federal Polytechnic, Bauchi utilize web-based/online tools to support teaching and learning?

S/NO	Variables	VHE	HE	ME	LE	VLE
1.	Use the internet to access scholarly works such as journals, e-zines, eBooks and articles etc.					
2.	Communicate with students on academic matters					
3.	Take online courses (e.g. Coursera)					
4.	Collaborate with experts in my field around the world					
5.	Use the web to download lecture materials					
6.	Administer tests online					
7.	Access course or learning management systems (e.g. Canvas)					
8.	Use the email to send or receive assignments to and from students					
9.	Deliver lecture and content (e.g. Skype, Facebook)					
10.	Use the web to look up reference information for study purposes (e.g. online dictionaries)					

Research Question Two: To what extent do lecturers of Federal Polytechnic, Bauchi utilize software tools to support teaching and learning?

S/NO	Variables	VHE	HE	ME	LE	VLE
11.	Use presentation software to prepare conference and lecture presentations (e.g. PowerPoint)					
12.	Use mathematical software such as SPSS for mathematical and scientific computations.					
13.	Use word processors to prepare lecture materials (e.g. Microsoft Word)					
14.	Use audio/video editing software to augment text and verbal lecture content (e.g. Audacity, Imovie)					
15.	Compute students result (e.g. Spreadsheet)					
16.	Use educational software for teaching and self-learning					
17.	Use database software to keep my students' academic information					

Research Question Three: To what extent do lecturers of Federal Polytechnic, Bauchi utilize hardware devices to support teaching and learning?

S/NO	Variables	VHE	HE	ME	LE	VLE
18.	Use computer to create interactive learning experience					
19.	Use hardware tools to communicate through text, drawings and diagrams with students.					
20.	Use computer for writing documents such as lecture materials					
21.	Use printers to print lecture handouts					
22.	Use projector to deliver lecture content to students					
23.	Use handheld devices (e.g. tablet, iPad) as personal organizer (e.g. diary, address book)					
24.	Use computer and mobile devices to access information/services on the internet					
25.	Use computer for general study, without accessing the web					
26.	Use the computer for creating and editing multimedia lecture contents					