EDUCATIONAL TECHNOLOGY IN NIGERIA UNIVERSITIES: STATUES QUO AND VISIONS FOR THE FUTURE

ANEKWE, JOSEPHINE UZOAMAKA, Ph.D.
Department of Curriculum Studies/ Educational Technology
University of Port Harcourt
E-mail- joeanekwe2k3@yahoo.com.uk
Phone Number: 08063466132

&

WILLIAMS, CHETA, Ph.D.
Department of Curriculum Studies/ Educational Technology
University of Port Harcourt Rivers State
chetawilliams@yahoo.com
Phone Number: 08037654398

Abstract

The paper looked at various definitions of Educational Technology (ET) but defined the acceptable one. ET was seen as the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological process and

resources. The four key elements inherent in the meaning were highlighted. The objectives of ET at both Macro and Micro levels, the relevance and the uses of ET were also discussed. The paper also looked at the statuesque of teaching and learning and revealed that teacher – centred method of instruction was still in use. It was therefore advocated strongly that learner-centred method which emphasis the of modern technologies for instructional delivery by integrated into teaching to enable the beneficiaries function effectively in the new world economy. The implications of these trends showed the clear visions of the future of ET which were also discussed. The ideals of ET in the future were x-rayed and their implications discussed. This process of change will further imply that education will become a lifelong process, important and accessible to all, and Nigerian universities will become centres of learning in not just for students, but for all members of the community. The paper concludes that we see a future that is enabling by educational technologies in Nigerian universities. The suggestion was therefore made that in order to achieve the visions of ET, the university learning environment has to be reviewed and improved. Otherwise, the status quo remains.

Introduction

Educational Technology (ET), in terms of terminology and structural composition has two basic components, viz: education and technology. Our focus here is on the later. It is usually noted that it is technology that holds the key to sustainable development of any nation; it is neither capital investment nor increased workforce. Therefore, before we consider the meaning and significance of educational technology, it will be pertinent to take a brief look at what technology is all about.

Meaning of Technology

The word "technology" is derived from the Greek word "techni" meaning art or skill and "logia" meaning science or study. Thus technology is the science of study of an art or skill. Technology has

been referred to as "the systematic" application of scientific or other organized knowledge to practical tasks (Galbraith, 1967). In other word, it is "the application of science to industry" (Mehlinger & Powers, 2002:10). Naughton (1986) in Aggarwal (2007) argued in his book, "Technology in School" that technology can be considered in two ways – technology as things and technology as social process. "Technology of Things" is the application of scientific knowledge to practical tasks by organizations that involves in 2 M's – men and machines while "Technology of Social Process" is the application of scientific and other organized knowledge to practical tasks by hierarchically ordered systems that involve men and machines. There is emphasis on the word "application" within these definitions that technology is the manner in which research is applied to solve practical problems. So, technology is not only the "tool" for the development of science but also the "change" in the social process.

Meaning and Definitions of Educational Technology

Davies (1978) cited in Agun and Imogie (1988) identifies three concepts of educational technology which represents three different approaches to educational technology. We have educational technology as hardware, as software and as systems approach.

Educational Technology as Hardware

It sees educational technology as the devices, equipment, machines, gadgets, tools and instruments used to promote teaching and learning. This is also known as the tools technology approach.

The hardware or product approach was greatly influenced by the physical sciences. It involves a direct application of the physical sciences to the problems of education. It entails the instrumentation, mechanization or automation of education. The goal is to make teaching more efficient by mechanizing or industrializing it. The tool technology failed because it concentrated on the production of tools for learning without considering the other important components of instruction. It was observed that little regard was given to the needs of

learners in schools, the nature of the curriculum contents, the objectives to be achieved, the needs of the teachers, etc. It became clear that these concrete devices could not by themselves solve all educational problems

Educational Technology as Software

The software approach to educational technology emphasizes careful design of the teaching – learning process using principles of behavioural sciences. It is the behavioural science concept of educational technology. Emphasis is on applying learning principles to the direct and deliberate shaping of behaviour. It is characterized by detailed tasks analysis, writing to precise objectives, selection of learning strategies, reinforcement of correct responses and constant evaluation.

Educational Technology as Systems Approach

The systems approach is also known as the step-by-step plan, systems analysis, systematic approach and systems technology. The systems approach is an attempt to remedy the inherent weakness of the approaches above. It sees educational technology as the systematic application of ideas, resources, people, materials and equipment to the solution of educational problems. The systems approach takes education as a system having a set of inputs which are subjected to a process, deisgned to produce certain outputs which are intended to meet the stipulated objectives of the system. The application of this type of educational technology takes the system of education as a whole and views it in the context of the specified objectives and functioning of its interrelated parts and the whole system under the existing constraints. If the system meets the requirements of the system objectives, it is maintained. If it does not fulfill the specified objectives, it is modified. As a result, various alternative strategies and tactics are explored, designed and implemented and the most appropriate and feasible one is retained.

Definitions of Educational Technology

The above discussions showed various attempts that have been made to define the term educational technology. Some of the definitions are shown below.

- Educational Technology is a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction (Agun & Imogie (1988:2).

- Educational Technology refers to hardware and software including television, radio, electronic classroom, instructional devices, still and motion pictures, 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.

- Educational Technology is concerned with designing the system as a whole: identifying aims and objectives, planning the learning environment, exploring and structuring the subject matters, selecting appropriate teaching strategies and learning media, evaluating the effectiveness of the learning system and using the insights gained from evaluation to improve that effectiveness for the future (Rowntree 1974).

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This new AECT definition (Janusewski & Molenda, 2008) becomes the latest guiding tool into 21st century of states as follows:

Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological process and resources.

A critical look at this definition implicates key elements that govern the meaning and role of the field. In the first instance, the focus is a 'study and ethical practice". This is singled out as only one component of a technological system. More so, by definition it implies ethical practice.

Second, the purpose of educational technology is "facilitating learning and improving performance". By so doing learning and performance become the bed rock of our field of study and practice. Be it as it may, facilitating includes the design of the environment, the organizing of resource and providing of tools that will aid learning which has to be deep rather than shallow learning

The third part of the definition tells how things could be done "by creating, using and managing" Nowadays these three key words relate to three different groups of people. Take for instance, a professional writer, director, artist etc was the director, the teacher was the "manager" of instruction, the student or the learner was the end user. Today as we advance in technology a person with a camera, a laptop and a network connection can create and upload videos for the world to see. He does not necessarily require every group to be around him before things happen. This falls in line with the definition "creating, using and managing".

The fourth stage of the definition deals with technological processes and resources. It is through technological processes and resources that creating, adopting and managing new, novel and innovative learning experiences become possible. The educators select technological process and resources, they create environments and design learning

experiences, and they assess learners and deep learning and evaluate the quality of performance.

Nevertheless, the AECT is important because it provides guidance and direction. With the operational definitions of educational technology that are appropriate, clarity and focus are added to what is being done. Consequently, a new AECT definition deserves to be a starting place in all courses that focus on educational technology.

These definitions outline the various operations that are carried out in the field of educational technology.

The need for standard definitions and terms in the field of educational technology has been the concern of the Association for Educational Communication and Technology in the United States of America (A.E.C.T). After 14 years of work, the Association came up with the most acceptable and professional definition:

Macro and Micro Level Objectives of Educational Technology (Objectives in Terms of Broad Educational Goals)

Aggarwal (2007) has lighted the objectives of ET at the Macro level as shown below:

1. Identification of educational needs and aspirations of the community.

2. Determination of the aims of education broad strategies and structure of education.

3. Developing a suitable curriculum with interaction of arts, human value and science.

4. Identification of man-material resources and strategies for achieving the desired aims of education.

5. Developing certain models leading to improvement in the process of teaching- learning.

6. Identification of the major constraints in the environment and the ways and means of learning them.

7. Assisting and extending vocational opportunities to masses especially neglected sectors of society.

8. Managing the entire educational system covering planning, implementation and evaluation phases.

Objectives of Educational Technology at the Micro Level (Objectives In Terms of Specific Class-room Teaching)

1. Identifying and analyzing the characteristics and educational needs of the students.

2. Determining the specific class-room objectives and stating them in behavioual terms.

3. Analyzing the contents of instruction and organizing them in proper sequence.

4. Identifying the available teaching- learning materials and resources.

5. Identifying the nature of the interaction of the sub-system like students, teachers teaching – learning materials, contents of instruction and methodologies.

6. Evaluating the effectiveness of the class-room teaching in terms of students performance or change in behaviour.

7. Providing appropriate feedback to the students as well as teachers to bring modification in the teaching – learning process.

The Relevance of ET in University Education in Nigeria are:

(i) To make teaching and learning more effective and more pleasurable;

(ii) ET in the University helps to analyze problems and to systematically provide solutions. Here instruction is more scientific through the appropriate use of reinforcement reward and application of research result in solving problems.

(iii) Teaching becomes more creative and dynamic.

(iv) Students are stimulated to learn more materials in less time because the quality of instruction is high.

(v) It makes learning concrete, real, immediate and permanent.

(vi) ET provides easy means and methods for giving instruction to learners (teaching) in different places at the same time through the closed circuit television option.

(vii) It helps to store information and makes it easy to retrieve and access such information through books, radios, televisions, video tapes, audio tapes, records and discs.

(viii) It provides the teacher the means of arousing and sustaining student's interests as well as changing their attitudes.

(ix) It bridges the gap between the learner and the learning situation, i.e. it brings instruction closer to the learner using still pictures, motion pictures and recordings.

(x) It helps to individualize instruction thus making each learner to work at his/her own pace.

(xi) It creates equal educational opportunity to all students who learn according to their individual abilities.

(xii)   It brings reality into the classroom through games and/or simulation of dangerous animals or enormous equipment or complex objects.

(xiii)   Experience not easily obtained or materials too expensive can be presented through educational technology.

Uses of Educational Technology are:

1. To improve instruction – qualitative

2. To learn more about people – quantitative

3. To learn more about learning – research

4. To reform the curriculum – substance

5. To improve the process of teaching and learning – method

6. To articulate the system – structure and information

The Status Quo of Teaching and Learning in Nigeria Universities

Learning at the tertiary level of education in Nigeria could be described as being effective if it results in bringing about the expected transformations in the attitude, skills and knowledge of higher education students over a period of time (Babalola and Jaiyeoba, 2008). Moreover, effective teaching and learning should result in producing graduates who are adequately informed, technically equipped and morally prepared to become productive workers, self-reliant entrepreneurs, responsible parents, good citizens, selfless leaders and capable of handling the increasing health risks (such as HIV/AIDS) in the 21st century.

Babalola and Jaiyeoba (2008) affirmed that teaching and learning in Nigerian universities is ineffective and this issue had become concern in Nigeria for so many reasons:

- The concern about poor learning in Nigerian Universities amplify as many of the Nigerian youths found it very difficult to

gain employment in the formal sector or end up working in poor conditions in the informal economy.

- Ineffective learning becomes a prominent suspect as scientific facts increasingly reveal that tertiary education graduates in Nigeria acquire skills in disciplines such as Economics, Law and Medicine that are neither demanded by the labour market nor required by the economy especially in the growth sectors such as petroleum, gas, agriculture, manufacturing, solid minerals, tourism and ICTS (FME, 2003, Babalola, 2007).

- Increase in scientific evidences about employer's complaints regarding poor graduate preparedness has heightened the concern of Nigerians about the state of learning in the nation's institutions of higher learning. For instance, Dabalen and Oni cited in Babalola (2007), in a survey of 55 public enterprises in Nigeria revealed that employers complained that skills of Nigerian graduates had steadily deteriorated between 1990 and 2000 and therefore, these graduates have become increasingly unproductive on the job.

- The failure of the authorities of Nigeria Universities in providing effective learning aside, poor attitude of the Nigerian government in providing facilities for effective teaching of ET seems to be an underpinning societal factor.

Colins and Halverson (2009) cited in Babalola (2007), stressed that university education must keep pace with the advances of learning technologies. Further, they noted that many developing countries lack different basic needs of life that their governments have learnt to concentrate their developmental efforts on the traditional education such as provision of classroom buildings, furniture, laboratory equipment, libraries and salaries. At the macro level, provision of infrastructural facilities such as road, water and electricity takes priority over the provision of technological facilities for university education.

Teaching and learning in Nigerian universities is presented generally in traditional way which is typically teacher-centred, with teachers doing most of the talking and intellectual work, while students are passive receptacles of the information provided. Teaching and learning in traditional educational paradigm in Nigerian Universities is often characterized by the following views learning as highlighted by UNESCO (2002):

1. **Learning is hard:** Many view of learning as a difficult and often tedious process. According to this view, if students are enjoying what they are doing in a learning activity, they probably are not learning.

2. **Learning is based on a deficit model of the student:** The system strives to identify deficiencies and weaknesses of the student. Based on noted deficiencies, students are tracked, categorized, remediated or failed.

3. **Learning is an individual process:** A London Times survey of English school children indicated that students almost unanimously rejected the idea of working individually. Rather, the preferred working collaboratively and more exiting curriculum. Above all, they wanted more work allowing them to work and think for themselves.

4. **Learning is facilitated by breaking content into small isolated units:** The educational system is often geared more to categorizing and analyzing patches of knowledge than to sewing them together. Bruer (1993) noted that the technology of mass education is quite adopt at "breaking knowledge and skills into thousands of little standardized, decontextualized pieces, which could be taught and tested one at a time".

5. **Learning is a linear process:** Frequently, the textbook or teacher provides only one linear path through a narrowly bounded content area or sequence of standardized instructional units. For instance, in a Mathematics text only one correct

problem solution trail many be offered for a specific problems. However, the problems encountered in daily life seldom have only one solution path or sequence.

6. **Learning is a process:** Of information transfer and reception. Much of our present learning enterprise in Nigerian university remains "information – oriented", emphasizing students reproducing knowledge rather than producing their own knowledge. It remains teacher centred. Many still see the role of the teacher a dispenser of information and the role of the student as a passive receiver who stores and repeater of the transmitted information. The prevalence of this view is supported by observations that teachers continue to rely on old standby such as lectures, textbook reading and fill – in- the worksheets practices that reduces student to passive recipients of information and fail to develop their thinking skills.

The observed situation in Nigerian universities notwithstanding, Educational technology has a number of trends that will help us to project where the field might be heading to in the future. The section that follows discusses the vision for ET in the future.

Need to shift to learner-centred Instruction

The need to shift from teacher-centred to learner – centred instruction should not be over-emphasized. As technology has created change in all aspects of society, it is also changing our expectations of what Nigerian university students must learn and how they are learning in order to function effectively in the new world economy. Students will have to learn to navigate through large amounts of information, to analyze and make decisions, and to master new knowledge domains in an increasingly technological society (UNESCO, 2002). This assertion was supported in Newby, Stepich, Lehman and Russell (2006) who opined technology has allowed individuals to obtain, assemble, analyze and communicate information in more details and at a much faster pace than ever before.

Further, they added that one consequence of this is the ever-increasing demand on education to help all learners acquire higher – level skills that allow them to more readily analyze, make decisions and solve more complex "real-world" problems. According to Bruer (1993), learners must rise above the role factual level to begin to think critically and creativity. These increased demands dictate changes in the way Nigerian universities academics interact with students; moreover, these changes must be grounded in an understanding of how a diverse population of individuals learn. Contributing further to this important issue, UNESCO (2002) affirmed that the students will need to be lifelong learners, collaborating with others in accomplishing complex tasks, and effectively using different systems for representing and communicating knowledge to others. A shift from teacher-centred instruction to learner-centred instruction is needed to enable students to acquire the new 21st century knowledge and skills.

Newby et al (2006) pointed out that of particular importance, however, will be teaching the higher-order skills and the manner in which students acquire them. A major emphasis must be on problem-solving and transfer. They emphasized the use of such methods as simulations, discovery, problem-solving, and cooperative groups for learners to experience and solve real-world problems. This implies that when the just stated methods are used, one will definitely notice a shift in a manner in which the learning experiences are planned and carried out. Instead of the traditional teacher's total control and manipulation, the importance of the learner's role in planning, implementation, and self-evaluation will be emphasized.

Nevertheless, Newby et al (2006) highlighted the use of mnemonics or specific drill and practice techniques for lower-order learning. In such cases, the teacher-centred "traditional" view of teaching may prove most efficient and effective.

University students engaged proactively engage with various sources of potentials information (for instance, the teacher, technology, parents, media) to gain insights into a problem and its possible solutions. The

teacher's role shifts to one of guide and facilitator who assists students in achieving their learning goals. The Tables below (Newby, Stepich, Lohman, and Russell, 2006) identify the shift that will take place in changing from a focus on teaching to a focus on learning.

Table 1: Key Role Changes in a Labour - Cantered Environment

For the Student	
A Shift From:	**A Shift To:**
Passively waiting for the teacher to give directions and information	Actively searching for needed information and learning experiences, determining what is needed, and seeking ways to attain it.
Always being in the role of the learner	Participating at times as the expert/knowledge provider
Always following given procedure	Desiring to explore, discover, and create unique solutions to learning problems
Viewing the teacher as the one who has all of the answers	Viewing the teacher as a resource, and helper who will encourage exploration and attempts to find unique solutions to problems
For the Teacher	
A Shift From:	**A Shift To:**
Always being viewed as the content expert and source for all of the answers	Participating at times as one who may not know it all but desires to learn
Being viewed as the primary source of information who continually directs it to students	Being viewed as a support, collaborator, and coach for students as they learn to gather and evaluate information for themselves.
Always asking the questions and controlling the focus of student learning	Actively coaching students to develop and pose their own questions and explore their own alternative ways of finding answers
Directing students through preset step-by-step exercise so that all achieve similar conclusions	Actively encouraging individuals to use their personal knowledge and skills to create unique solutions to problems

Visions of Educational Technology (ET) in the Future

The future of ET in Nigerian universities could be viewed to be very bright and innovative. New developments will occur and old patterns will fail to hold as before. Nevertheless, developments of ET over the past 100 years certainly do suggest some trends. Some of those trends are seen in the need for paradigm shift from teaching to learning (UNESCO, 2002) and in discipline convergence; new perspectives on learning, media convergence, continuing computer developments and growth of the internet, than we are able to make some predictions. The implications of these trends may not always be clear, but it is possible, at least in some cases, to see the direction in which we are headed. So, knowing which way we are going helps us to have a clear vision of the future of ET:

*   Horizon Technologies

A number of technologies are merging in importance today. Many of these technologies are not yet fully functional or widely implemented. But the nature of these technologies suggests that thy could become increasingly important to teaching and learning. This is called "horizon technologies" because, like the horizon, we can see them in the distance although we are not altogether sure what they will look like when we get closer. Some of these horizon technologies are as shown below:

*   Artificial Intelligence (AI)

A1 is a branch of computer science concerned with the design of computers and software that are capable of responding in ways that mimic human thinking. One successful result of A1 research has been the development of "expert system" programs that embody the knowledge and skills of an expert in a particular discipline. They have already proven to be successful in fields like oil exploration and medical diagnosis. In education, the concept of the expert system has led to the development of intelligent, tutoring systems, sometimes called Intelligent Computer – Assisted Instruction.

*   Speech and handwriting recognition

Another outgrowth of A1 research has been developments in speech and handwriting recognition. Speech recognition systems translate speech into text that the computer commends (e.g. opening or closing applications) issued by voice. Also, handwriting recognition software is now part of the operating system on Table PCs and personal digital assistants (PDAs). This software translates handwritten notes into text that can be saved and edited on the computer.

*   Wireless Computing

A recent trend that has rapidly become important to education and businesses alike is wireless forms of connectivity. A widespread standard for wireless LANS, IEEE 802.11b, supports computer – to – network connectivity with a fairly substantial range (up to hundreds of feet) and reasonably fast connections (up till 11mbs). Faster wireless connectivity is supported by newer standards, IEEE802 11a and IEEE 802.11g (the latter being backwards compatible with IEEE 802.11b), which promise to become more widespread in the near future. Another wireless networking standard called "Bluetooth" supports short-range connectivity between computers and a variety of peripheral devices, such as printers.

*   Broadband Network Connectivity

In the context of the internet, broadband generally refers to a fast connectivity that can support rapid transmission of large amounts of information. The term is often used to describe cable modem and DSL (digital subscriber line) connectivity, which is much faster than typical dial – up services. While most universities would possess high – speed connections to the internet, broadband is bringing fast internet connectivity to an increasing number of homes as well.

*   New Web Technologies

In addition to new ways of connecting to the internet, several new Web technologies are under development today. New ways of defining web

pages, such as cascading style sheets (CSS) and dynamics IITML (DIITML), are becoming an important tool for data exchange – between different computer systems on the web. These developments promise to make web pages more interactive and flexible. In addition, Java, a computer language designed for making platform independent applications that can be distributed over the web, is emerging as one of the most important computer languages in use today. Java is also the language that underlies JSP (Java Server Pages), a technology for linking databases with web pages to produce dynamic, database – driven web content.

*   Handheld Devices

Since their inception, computing devices have grown steadily more compacts. Today, many schools are moving away from desktop computers and toward laptops and tablet PCs. The next generation of computing devices promises to be even smaller. Graphing calculators are already a staple in many mathematics classes. Now a new generation of personal digital assistants (PDAs), running operating systems such as the Palm OS or Windows CE, are finding their way into classrooms as multipurpose tools. They can be used for data entry, note taking, calculations, web browsing, and a host of other functions. As they continue to grow, more capable handheld devices promise to become essential educational tools that in many cases may replace larger and more and more expensive computers.

*   Virtual Reality

Another emerging area of computer development is virtual reality. Virtual reality (VR) refers to a computer – generated, three-dimensional, visual representation of an environment that responds to the user's motion within it. Today, VR systems usually consist of a computer linked to special headgear and body suits or gloves worn by the user. The headgear projects the image of a three – dimensional world before the user and senses the motion of the user's head so that as the head turns, the image the user sees also turns appropriately.

With a sensor-equipped glove, the user can reach out and touch or grab objects in the virtual environment. For example, a student studying organic chemistry might be able to reach and rotate an organic molecule in three dimensions to better understand its structure and function. As VR technology improves, we can envision a variety of educational applications. It may be possible for students to take virtual field trips – re-creations of historical events, travel to faraway places, or journeys inside the human body. In addition, students may be able to perform virtual tasks such as mixing dangerous chemicals or learning how to perform an operation without the risk and expense of the real thing. Virtual reality could make simulations incredible lifelike. The possibilities are truly exciting.

Ideals of ET in Future for Nigerian Universities

Our discussion so far implies that we envision a future where teachers and students embrace and integrate ET and use them to improve both teaching and learning. To be sure, this will mean that there must be some important changes in education. The following are possible outcomes of this process of change as highlighted in Newby, Stepich, Lehman & Russell (2006):

1. Multimedia learning resources, available via information networks, will proliferate and become an essential feature of education.

2. Teachers and students alike will have access to powerful, portable compacting devices that will be wirelessly connected to network resources.

3. Learning increasingly will take place in authentic contexts and focus on authentic tasks. Students will work on real problems, finding their own answers. Technology will be one tool in that process.

4. Students will become active learners, collaborating with one another and with more experienced members of society, to seek out information and gain knowledge.

5. Teachers' roles will tend to shift from "the sage on the stage" to the "guide on the side". Instead of conveying information, they will help learners make use of new information tools to find, analyze and synthesize information, to solve problems, to think creativity and to construct their own understandings.

6. Education will become a lifelong process, important and accessible to all, and Nigerian universities will become centres of learning in not just for students, but for all members of the community.

   Education will focus increasingly on authentic performance-based forms of assessment. Students will be judged by their ability to find and use information to solve genuine problems. The boundaries separating schools from each other and from the community will disappear.

Using distance learning technologies, including the internet, students will learn from teachers at other locations and collaborate with students at other locations. Teachers will learn alongside students. Students will learn from other students or from members of the community. Communities will change as technologies enables collaboration over distances.

Conclusion

ET has a very bright future in Nigeria universities. This is a future that is not just about educational technology. University education is bigger than that. However, without educational technology, it will be very difficult for us to get where we need to go. We see a future that is enabled by educational technologies in Nigerian universities.

Suggestions

Based on the discussions thus far in this paper, the following suggestions are put forward:

(1)   The university academics should be trained in the use of modern technologies for instructional delivery.

(2)   Technological facilities have to be adequately provided to give room for learner-centred instruction in Nigerian universities

(3)   Awareness campaigns are needed for both the university academics and the students on the ideals of Educational Technology in teaching and learning.

(4)   In order to achieve the visions of ET for the future, the university learning environment has to be reviewed and improved. Otherwise, the statuesque remains.

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