Literature evidence on the application of ICT in teaching and learning in TVET programmes and its implication for sustainable development in Nigeria

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Abstract

This paper provides a comprehensive review of Information and Communication Technology (ICT) usage in Technical Vocational Education and Training (TVET). It unveiled the role of ICTs for teaching and learning in TVET programmes. It identified four different major applications of ICTs in TVET. It also discussed the common types of ICTs used in teaching and learning in TVET such as: audio-cassette tapes, radio, videotapes, cd-rom and dvd, internet/web-based training, web-based training programmes, audio conferencing, audio graphics, interactive television and videoconferencing. This review identified gaps in ICT usage in Nigeria TVET programmes and the directions that future studies may take to address these gaps. Barriers to the application of ICTs in Nigeria TVET delivery system as well as the implication was also discussed. It was concluded that while ICT-enhanced TVET holds great promise, its widespread implementation also poses some immediate challenges with respect to: capital outlays in ICT hardware and software, disparity in access to ICT facilities (digital divide as well as appropriate strategies for integrating technology across curricula among others. Achieving sustainable development in Nigeria via TVET implies that ICTs be fully utilize in TVET to enhance effective instructional delivery for a better Nigeria in the 21st century.
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Keyword: Information and communication technology, Sustainable development. Teaching, Learning, Technical and Vocational Education and Training.

Introduction

The concept of sustainable development has been defined and interpreted in widely ways. According to Abu and Seung (2013), one of such broadly accepted definition is that of the World Commission on Environment and Development (WCED) report (Brundtland Commission report) that first defined sustainable development as development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. Here sustainable development is seen as a new form of development perspective which integrates the production process with resources conservation and environmental enhancement which should meet the need of the present without compromising our ability to meet those of the future. In the same vein, Shan (2013) defined sustainable development as the management and conservation of the natural resources base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and

future generation. To this end, Arokoyu (2004) argued that sustainable development is inherently a value-laden concept, in that it implies responsibility for both present and future generation. Sustainable development is concerned with the development of individuals and that of the economy at large.

Sustainable development has become a key concept which is now central to the programmes of many governments, businesses, educational institutions and non-government organizations around the world. This is because sustainable development concerns a process of change and is heavily dependent upon local contexts, needs and interests. Researchers have shown that sustainable development can only be achieved when the majority of the citizens in a country are equipped with the relevant vocation and technical skills in various occupational areas. In Nigeria, the aspect of education saddled with the responsibility for equipping individuals with relevant work skills in specific occupational areas is TVET. TVET according to Atsumbe (2014), is a form of education that prepares learners who could apply relevant practical skill to make positive changes within their society and afford a self dependent life. TVET major objective is to prepare individuals for employment in chosen occupations by equipping them with vocational skills, knowledge and attitude necessary for employment in specific occupations. TVET equips individuals with the requisite technical skills for survival in the world of work. Educational scholars and researchers have several times attested to the fact that this form of education provides self employment, enhance productivity and self reliance.

TVET gives individual the skills to live, learn and work as productive citizen. It reduces the over dependence of graduates on government for employment. The National Policy on Education (FRN, 2013) described TVET as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Specifically the National Policy on Education (FRN, 2013) stated that the goals of TVET shall be to: provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical level; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and give training and impart the necessary skills to individuals who shall be self-reliant economically.

TVET institutions in Nigeria include universities, polytechnics and colleges of technology, technical colleges, and vocational training centres among others. Technical colleges are regarded as one of the principal TVET institution in Nigeria for the training of craftsmen and women. Achieving the national goals of TVET in Nigeria can only be possible when TVET programmes in Nigerian TVET institutions strongly focus on effective teaching and learning. Teaching is the process of transferring information from the teacher to the learner to facilitate desirable change in behaviour in the learner; while learning can be define as a relatively permanent change in behaviour that occurs in a learner when the learner is expose to some experiences or training (Akamobi, 2005). Teaching and learning are two activities that are geared towards the attainment of educational goals. According to Ayeni and Ogunbaru (2013) teaching and learning refers to an organized instructional process that is consciously geared towards transforming and developing students' intellectual ability, skills, ethics and values to enable individuals function effectively and become self reliant, at the same time contribute positively to societal development.

From these explanations it is obvious that for successfully attainment of the purpose of teaching and learning in TVET to acquire relevant knowledge and work skills, adequate instructional tools and facilities must be put in place in TVET programmes in Nigerian TVET institutions. Kurya and Hassan (2007) revealed that in several developed and rapidly developing countries, teaching and learning in TVET has greatly been improved through the use of Information and Communication Technology (ICT). Margaret (2005) defined ICT or information technologies as an umbrella term that includes any communication device or information transfer application encompassing: radio, television, cellular phones, computers and network hardware and software, satellite systems as well as the various services and applications associated with them, such as video conferencing and distance learning. Information and communications technologies (ICTs) cuts across a variety of technologies including: computer, microelectronics and related technologies including microchip and microprocessor-based technologies; multimedia and other information processing technologies and systems; telecommunications technologies and infrastructure (fixed line, wireless, satellite based and mobile infrastructure); and communication network technologies and infrastructure (including local and wide area communications and computer networks for voice, data and video).

The revolutionary potentials of ICT lie in their capacities to instantaneously connect vast networks of individuals and organizations across great geographic distances at very little cost. As such ICTs have been key enabler of sustainable development, globalization, facilitating worldwide flows of information, capital, ideas, people and products. ICT application has become relevant because the increased use of ICTs in TVET in developed countries has resulted in a major paradigm shift, from a total dependence on the objectivist paradigm to a growing adherence to the cognitivist and constructivist paradigms. For example the use of ICTs in distance education has resulted in a pedagogy, which is constructivist, collaborative and interactive (Wonacott, 2001). Even though ICT applications is very relevant in bringing about a functional and effective TVET programmes in developed countries, public awareness of ICT and its application in Nigeria TVET programme is low due to several militating factors especially that of "digital divide" prevalence in Nigeria and other developing countries.

Digital divide refers to the gap or imbalance or disparity that exists between those who have access to information technologies and those who do not (Kafka, 2013). It connotes inequalities between those who have computers and online access and those who do not. While ICTs application hold promises for improving access to education there is also growing concerns regarding the divide that is creating among people. Chris (2003) warned about the emerging form of exclusion created by the development of new ICTs by those in developing countries like Nigeria. Limited access to ICT application in TVET particularly in Nigeria rural areas and for disadvantaged groups continues to be a major issue. While ICT applications have become the foundation for effective teaching and learning in TVET in developed countries, there is inadequate literature evidence and research regarding ICT implementation and use in TVET programmes in Nigeria. The limited work on the potential impact of ICT applications in TVET programmes has created a gap in the existing body of knowledge as regards ICT applications in TVET and its implication for sustainable development. The researchers therefore deem it necessary to review and unveil research literature evidence concerning the application of ICT in teaching and learning in TVET programmes and its implication for sustainable development in Nigeria.

Role of ICTs for Teaching and Learning in TVET Programmes

ICTs are revolutionizing technical education by removing distance from education and making knowledge and skills more accessible to all. ICT enhanced learning in TVET will play a crucial role in the development of a lifelong learning culture and has the capacity to empower learners by providing them with multiple pathways that offer choices and channels to meet their education and training needs (Israel, 2014). It is not surprising therefore to see a growing interest in ICT enhanced TVET across the world. ICT enhanced TVET or ICT driven TVET may be defined as the array of hardware and software used in the teaching and learning systems that include computer-based training systems, multimedia systems, electronic performance support systems, telecommunications systems, as well as the Internet with World Wide Web systems.

The rate at which the Internet is being accessed keeps increasing at lightning speed. ICT driven TVET can enhance teaching and learning in TVET programmes; it has the potential to become cost-effective as it offers greater flexibility regarding time and location of training delivery (Khan , Mahbub & Clement, 2012). ICT enhanced learning in TVET provides greater flexibility to adapt teaching and learning to meet learners' cognitive and learning styles. The evolution and dynamic application of ICTs in teaching and learning in TVET programmes in developed countries has resulted in a paradigm shift in TVET delivery system. ICTs are changing the way people learn, offering new alternatives to the traditional classroom. In this 21st century, it is essential for learners to have access to education anytime and anywhere. Haddad and Draxler (2002) stated that lifelong learning and training for the workplace cannot be confined to the traditional classroom. It is unrealistic and unaffordable to continue to ask learners to come to a designated place every time they have to engage in learning.

ICTs allow the delivery of education to adapt to an individual needs as opposed to having the individual adapt to how the education is delivered. By application of ICT in TVET, teaching and learning will not be confined to the four walls of a classroom but to wherever and whenever the learner deems appropriate. Education will not be a location anymore, but a teaching and learning activity that can be access anytime and from anywhere. Besides the great potential of ICTs in providing education to anyone, anytime and anywhere, ICTs have encouraged new research and development in teaching and learning techniques. As stated by Dean (2002), Schank, the founder of Cognitive Arts, believes that educational institutions must adopt a new way of teaching. He claims that students learn better through experiential and emotional learning

rather than through memorizing names and dates and thus, educators must simulate real-world environments. ICTs can be used to facilitate these types of environments. An example of this is using flight simulators to train novice pilots, artisans, craftsmen, technicians and technologists' as well as several other vocational and technical instructors (Dean, 2002).

In several advanced countries, ICT has greatly been used in teaching attitudes, practical skills, workplace training, study at home, informal training, virtual internship, and assistive technology for accommodating people with special needs. However, selecting a technology or a combination of technologies for teaching and learning depends on many factors, such as technical know-how of the teacher in ICT usage, available infrastructure, pedagogical constraints, learners' characteristics, subject matter, content, and time available to teach and learn.

Application of ICTs in TVET Programmes

Kafka (2013) identified four different major applications of ICTs in TVET, namely: technology as curriculum, technology as a delivery mechanism, technology as a complement to instruction, and technology as an instructional tool. Following is a brief description of each approach.

Technology as curriculum: When using technology as curriculum the focus is on developing ICT literacy skills. There are two types of ICT literacy skill sets. The first is generic ICT literacy skills such as keyboarding, word-processing, using databases, using spreadsheets, desktop publishing and using the Internet for research and communication (Nkanu & Okon ,2010). In this network economy every graduate from TVET programmes needs to possess these essential and generic ICT literacy skills. The second ICT skill sets are the occupationally specific ICT literacy skills. Examples of these skills include the ability to use CNC equipment, work with CAD/CAM, and operate equipment with digital system controls.

Technology as delivery mechanism: When technology is used as a delivery mechanism the focus is on packaging course content for digital delivery. Common approaches in current use include: computer-assisted instruction (CAI), computer-based instruction (CBI), and web-based or online instruction. Open and Distance Learning programmes make extensive use of technology as their delivery mechanism.

Technology as a complement to instruction: When technology is used to complement instruction the emphasis is on providing opportunities to practice skills taught and extending

learning by working with specific software applications (Kasworm and Londoner, 2000). Simulators are often used in TVET to address safety concerns during the initial phase of training and to offset cost in renting equipment for training crane operators and truck drivers. In its simplest form, technology can be used for drill and practice to complement instruction.

Technology as an instructional tool: Human learning is a very complex process. In spite of years of research in education, scholars understanding of how human learn are still limited. For this reason educators strive to use the little that is known about human learning whenever they engage in the act of teaching and learning. Technology is used as instructional tool to enhance more effective teaching and learning in TVET. Kafka (2013) revealed that the teaching and learning is more effective when more of the sense organs are involved in the process. Analysis of the retention rate through the various senses indicates that ICTs can be used to create a variety of external conditions that are conducive to learning and retention.

Following is a list of different types of audiovisual aids that can be used to maximize learning outcomes in TVET programmes. Audiovisual Aids: Over head projector; World Wide Web, Television, Slide projector, Film strip projector, Video Projector, Simulators, Digital Cameras, Graphical interfaces, Scanners, Online publishing, Telephone, Printed materials, Radio, Chalk board, Tape recorder, Electronic board, Computer, One or two way video, CD player, Satellites, Internet & Local area network (LAN) and Interactive television (Kafka ,2013).

Common Types of ICTs used in Teaching and Learning in TVET

There are a variety of different technologies that can be used in TVET. Each of these technologies according to Woolley and Booker (2002) has its own peculiar qualities and limitations, and different situations call for different technologies.

Audio-Cassette Tapes: Audiotapes can be played by any standard cassette player. Through audio, the tapes can convey information that may be easier to illustrate with sound than simply through text or diagrams. It can accompany other means of instruction (print-based material and instruction via classroom teacher) and provide detailed information step-by-step.

The advantage of using audio cassette tapes is that tapes are recordable and thus can be reproduced easily and cheaply. Tapes provide a permanent and flexible storage of information. The tapes can be stopped to allow for classroom interaction and discussion and they can be

replayed in instances where it might be beneficial to repeat parts of lessons. Radio programmes can be recorded to allow the lessons to be replayed at a later date (Perraton, Creed and Robinson, 2002). Since tapes are relatively small they are portable and can be transported to different areas through the postal service or other delivery service.

Radio: Radio is one of the oldest technologies used for distance education (Stevens, 2001). Radio programmes can be broadcast or interactive. Broadcast radio mirrors the traditional classroom-based model where an instructor lectures through the radio programme and students typically follow with print materials. It can be thought of as "strict" one-way communication where students are not expected to respond and therefore it is hard to gauge the progress of the students (Stevens, 2001). Interactive radio instruction (IRI) can be described as an interactive lesson where an external teaching element is involved in classroom activities via radio. IRI allows the students to participate as the lesson progresses. To be interactive, a lesson can have spaces or pauses where students can think, develop responses, discuss with other students, or have time to let information sink in.

Radio instruction involves the production, transmission, and reception of the radio programmes .There are different types of radios available to learners: electric radios (transistor radios), battery-powered radios, and solar-powered crank radios (Lucky & Achebe, 2013). Thus, students and the educational organizations can choose a radio that best suits their situation based on the availability of electricity and the supply of batteries. In some cases it may be more cost-effective in the long term to use a solar-powered crank radio. Radio is advantageous since it is relatively inexpensive for learners in developing countries and it is accessible for the illiterate and the poor. Due to the availability of inexpensive radio receivers, it has the potential to reach a large number of learners (Stevens, 2001).

Videotapes: Videotapes appeal to both audio and visual senses. Real-life situations can best be presented and described using video as opposed to using text or audio (Nunes and Gailbe, 2002). Videos can be used when introducing a new theme to motivate and contextualize learning, after a topic has been addressed in a few class periods to aid students in applying the knowledge they acquired, or after an entire module is completed to show connections to other subjects and disciplines (Nunes and Gailbe, 2002). The learner has the flexibility to replay, pause, and rewind videotapes and can repeat lessons as often as they wish. Videotape can support the teaching of

practical skills delivered through open and distance learning. Other benefits include: ease of use for the learner, low duplication costs, relatively wide access to the playback technology, and educational effectiveness for imparting practical information (Stevens, 2001). Another advantage is that captions and visual cues can be used in the videotapes to help the hearing-impaired.

CD-ROM and DVD: CD-ROMs (Compact Disc-Read Only Memory) store information digitally and they can be used on any computer equipped with a CD-ROM drive. DVDs (Digital Video Disk or Digital Versatile Disk) are similar to CD-ROMs and can be used the same way as CD-ROMs but contain more information. CD-ROMs have a large capacity and can support the storage of information in a variety of formats including text, animation, video, audio, and graphics. Thus, learning materials can be presented in different ways. Since the material is stored digitally on CD-ROM or DVD, it is very durable and the quality does not degrade after repeated use. However, scratching the surface or other abuse of the medium may prohibit it from being read by the CD-ROM drive.

Internet/Web-Based Training: Internet/Web-Based training provides an environment where students' access and study course materials online. It may involve the use of live e-learning tools such as application sharing, Internet telephony, online whiteboards, break-away rooms, discussion boards, and chat and messaging programmes that allow real-time interaction between instructors and learners. It can also be used to transmit text, graphics, images, animation, or video. The required tools for online learning include a personal computer and an Internet connection. There are several ways a user can connect to the Internet: standard analog modem (for example, 56 Kbps), Digital Subscriber Line (DSL), cable modem, Integrated Services Digital Network (ISDN), Local Area Network (LAN), cellular, and wireless broadband (fixed wireless and satellite). All connections except for a standard analog modem connection are considered broadband connections. All of these methods allow connection to an Internet Service Provider (ISP) that provides a gateway to the rest of the Internet. The major advantage of web-based training is that students can study anytime at their own pace and anywhere as long as there is a computer connected to the Internet

Web-Based Training (WBT) Programmes: Many course development tools are now available, which allows instructors with no computer programming skills to develop high-quality web-based training programmes. The three most commonly used platforms are: Blackboard

(http://www.blackboard.com), Desire2Learn (http://www.desire2learn.com), and WebCT (http://www.webct.com). All three platforms are server-based and allow access through a web browser to provide e-learning solutions through the Web.

All three platforms have the advantage and capacity to: provide course materials; manage enrolment and registration; develop evaluation material such as quizzes, tests, or assignments; communicate with instructor(s) and students online through an announcement section, discussion boards, e-mail, real-time chat sessions or e-class rooms, and an interactive whiteboard; take and save notes about a course; manage grades and provide the grades to the students; present important dates through a calendar tool; as well as provide links to related web sites.

Audio conferencing: Audio conferencing allows two-way, real-time communication between instructors and learners through audio (Stevens, 2001). The main advantage of audio conferencing is that it allows for direct, two-way interaction between participants. Discussions occur in real-time where learners can ask questions and instructors can respond immediately. Another advantage is its low set-up and operating cost.

Audio graphics: Audio graphics is essentially audio conferencing accompanied by visual and graphical aids. "Graphics can be transmitted by facsimile (fax) machine, still video system, computers (text or graphic display), or electronic drawing systems (such as electronic whiteboard) which allow a participant to draw or write on an electronic screen which is transmitted to a remote site where other participants may see it. Audio graphics provide the same advantages of audio conferencing (two-way audio interaction and low set-up and operating costs,) while having an additional benefit of a visual aid for learners.

Interactive Television: In this context, interactive television refers to instruction occurring over broadcast television. It allows learners to receive live television instruction remotely, away from the actual instructor. The instructor(s) are located at a broadcast studio and the learners view the instructor(s) on a television monitor. Interaction is provided by one or more additional components. They can ask questions and/or provide feedback to the instructor through a number of mechanisms that can be used either independently or in combination (Stevens, 2001). The main advantage of interactive television is that instruction can be transmitted to several different sites, and thus potentially reach a large number of learners using existing broadcasting infrastructure.

Videoconferencing: Videoconferencing allows participating individuals in different locations to see and hear each other in real-time through videoconferencing equipment (Stevens, 2001). The main advantage of videoconferencing is that it allows real-time, two-way interaction between individuals in different places. Participating parties may be in remote areas and may be separated by large distances. All individuals involved in the educational system from the teachers, students, curriculum developers, and specialists, to the policy makers can participate in a videoconference. It can be used for presentations, teaching sessions, discussion, course delivery (in combination with other media), and student support (Perraton et al., 2002). During course delivery and lectures, instructors can gauge a student's progress and responsiveness immediately. Instructors can answer questions and provide feedback immediately.

Barriers to the Application of ICTs in Nigeria TVET Delivery System

While ICT-enhanced TVET holds great promise, its widespread implementation also poses some immediate challenges with respect to: capital outlays in hardware and software, unequal access or differences in access to ICT facilities (digital divide), appropriate strategies for integrating technology across curricula, copyright issues, and availability of pedagogically sound ICT materials. Teacher development is a major challenge for the implementation of ICT - enhanced learning since for most teachers are resistance to change and adapting new information technologies in instructional delivery poses a problem to them.

The digital divide, a disparity in access to ICTs between countries and communities is caused by many factors such as: inadequate infrastructure, high cost of access, inappropriate or weak policy regimes, inefficiency in the provision of telecommunication network, language divides (language differences), poor economy and lack of locally created content (Mutula, 2004). The digital divide is a disadvantage and reduces access rate at which Nigerians and other developing nations can contribute and benefits from the information age and global communities. This was buttressed by Al-saadi, (2006) who lamented bitterly on the over dependent of Nigeria and other developing countries on ICT consumption instead of ICT production which consequently keeps them in perpetual bondage of underdevelopment and poverty.

Nwabueze and Ozioko (2011) has identified most common challenges faced by employers who have attempted to use ICTs for workplace learning. These are: lack of time, money and support; technological and systemic limitations; difficulty of using ICTs gadget by

most people; resistance to change and inadequate planning for availability of ICT facilities and usage. Other barriers related to the implementation of ICT-enhanced learning in TVET are: content and curriculum disparities, appropriateness and efficacy of technologies as well unstable electrical power supply.

Barriers to ICT application in TVET can also be categorize into two: institutional barriers and student barriers. The institutional barriers include : lack of ICT equipment and support; difficulties in scheduling ICT-enhanced instructional delivery; lack of adequate resources, high cost of programme development; difficulties in recruiting qualified instructors; as well as difficulties in maintaining reliable technical assistance and support. Student barriers include: high cost of equipment and access to technology; poor motivation of students; lack of immediate feedback from instructors; lack of adequate support and services; inadequate ICT literacy skills as well as lack of skills in managing data and time.

Gaps in ICT usage in Nigeria TVET programmes

Based on comparison of the extent of ICT usage in TVET programmes in developed countries and that of Nigeria, the following gaps emerged:

1. The extent of ICT usage in teaching and learning in Nigeria TVET programmes is very low.

2. The curriculum for educating and training of TVET teachers and students in Nigeria higher institutions is grossly deficient in application of ICTs in teaching and learning.

3. The knowledge and skills required to design, identify, select and evaluate the most appropriate type of ICTs to use for various teaching and learning situation are lacking.

4. The practical skills to use various types of information and communication technologies in the classrooms are inadequate.

5. The basic maintenance skills required to ensure that the information and communication technologies are in good condition whenever they are required for use are also not in the technical teacher training curriculum.

Implications to the application of ICT for 21st century TVET Programmes

The current continuous high rate of application of   information and communication technologies in teaching and learning in TVET programmes in developed countries has great implications for sustainable development. For the developed countries that have adequate ICT infrastructures and technical manpower, it will mean continuous technologically development and better

instructional delivery in TVET programmes. For the underdeveloped and developing countries like Nigeria with inadequate ICT infrastructures and low access to ICT usage, it will mean a further widening of the digital gap or imbalance or disparity that exists between those who have access to information technologies and those who do not (digital divide). More so that, the integration of ICTs in TVET requires considerable investment in time and resources. When planning to implement ICT-enhanced learning, it is critical to consider the instructional and cost-effectiveness of the technologies. Achieving this demand there is need for service of ICT experts who can put in appropriate ICT infrastructures and also train teachers to effectively utilize various information and communication technologies in teaching and learning in TVET programmes.

Way forward for successfully application of ICT in teaching and learning of TVET programmes

1. The National Board for Technical Education (NBTE) and other stakeholders responsible for regulation and quality control in Nigeria TVET programmes should periodically give detail orientation to TVET teachers on the need to utilize ICTs in delivering instruction in TVET programmes at all levels.

2. Nigeria TVET institutions should strengthen the TVET minimum standard document by including teacher and student activities that focuses on application of ICTs in teaching and learning.

3. The management of TVET institutions in Nigeria should organize capacity building workshop for their teachers to strengthen their capacities in the application of ICTs in teaching and learning in TVET.

4. Nigeria TVET institutions should also make available the information and communication technologies needed for teaching and learning in TVET programmes.

5. The curriculum for educating and training of TVET teachers and students in Nigeria higher institutions should be review to contain more activities that will stimulate creativity and innovative application of various types of information and communication technologies in teaching and learning in TVET programmes.

Conclusion

For Nigeria economy to prosper and attain sustainable development there is need to fully utilize ICTs in teaching and learning in TVET programmes. This is because TVET is the vehicle

for technological development and ICT is the driver. It is obvious from this review, that a wide variety of ICTs are now available for teaching and learning in TVET in developed countries. Nigeria TVET teachers need to keep up to date in order to maintain their occupational literacy skills. Those involved in the integration of ICT-enhanced learning need training in the pedagogical applications of ICTs for teaching and learning. Students also need a set of ICT literacy skills in order to succeed in ICT- enhanced learning environments. Countries with more advanced economies need to assist developing countries in establishing the necessary ICT infrastructure and capacity building in TVET. The open courseware initiative and public repository of learning objects must be encouraged to minimize the effects of the digital divide on Nigeria.

This is because it is the extent of utilization of (ICTs) in a nation that defines a nation as developed or underdeveloped. The challenges confronting the progress of ICTs application in TVET in Nigeria must be recognized and fought vigorously by governments at all levels, the private sector and other stake holders in the technical education sector. We must embrace ICTs and channel adequate financial resources towards ICTs production, mass training and retraining of Nigerians to be ICT literate and experts in utilization of ICTs in instructional delivery in TVET. The time to rededicate ourselves to full application of ICT in TVET is now. Therefore for Nigeria to achieve the sustainable development, the researchers recommended that we must embrace ICT, love ICT, think ICT, talk ICT , trust ICTs and fully apply ICTs in enhancing effective instructional delivery for a better Nigeria in the 21st century.

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