

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN INSTRUCTIONAL DELIVERY IN VOCATIONAL AND TECHNICAL EDUCATION: BARRIERS AND WAY FORWARD

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Abstract

This study examined the application of ICT in instructional delivery in Vocational and Technical Education. It asserted that the effectiveness, plausibility and sustainability of Vocational and Technical Education cannot actively be realized in this 21st century and technological age without the support services of ICT and its integration to instructional delivery thereon. Various paraphernalia of the pivotal roles played by ICT in Vocational and Technical Education context, ICT skills and competencies needed by Teachers for quality Vocational Education delivery were elucidated. Barriers such as financial constraints, inadequate infrastructural provisions, Teachers related factors, school factors and Technological factors were identified to be the major hindrances to the adequate integration of ICT in instructional delivery. The study recommended that Government at all levels of education should show priority attention to ICT usage in Vocational and Technical Education through effective ICT policy implementation and adequate funding of the Vocational Education. More so, ICT integration into vocational education programme should be by the use of instructional design.

Keywords: ICT, Application, Instructional Delivery, Vocational and TeEducation

Introduction

Education is truly the bedrock of many countries and societies socioeconomic, political and cultural development. It is one of the main instruments for national transformation, social change, likewise an aggregate tool for human emancipation and public enlightenment. Through education, rightful skills, competences and knowledge is acquired by individuals for their active contributions and participation in socio-economic activities within their environment. Given the relevance of education to both human and society development which can never be overemphasized; huge emphasis has always been placed on the effective administration and management of education for environmental sustainability and human progress by all countries of the world in the educational system, (UNESCO, 2000).

Vocational education is concerned with preparing students for jobs by providing them with expertise, skills, and appropriate behaviours in the workplace. Furthermore, vocational education according to (UNESCO, 2000) is defined as:

- A component of all-purpose education;
- Method of planning for vocational fields and successful job contribution;
- A component of lifelong learning and citizenship preparation.
- A tool for fostering ecologically friendly sustainable growth; and
- A way of alleviating lack.

Education has made significant contributions and impacts towards national development in the country. Although, the effectiveness, plausibility (in terms of credibility) and sustainability of the programme cannot actively be realized in this 21st Century and technological age without administration of such educational support service as the Information and Communication Technologies (ICTs). The Information and Communication Technologies (ICTs) which

continues to play significant role and make positive impact in the education sector, according Victor (2019), can simply be defined as the study or the use of computers for storing, receiving, analyzing, manipulating and transmitting of information used in the educational sector and the business sector as well.

Presently, the world is in a computer age and gone are those days when everything has to be done manually or traditionally. Ugwuogo (2019) stressed that there is no doubt that technology (that is, ICTs) has come to stay and today the society is reaping its numerous benefits in all aspects of life from domestic activities to complex problem-solving activities. In all processes, it has added a lot of value to both the living processes and in all aspects of the educational processes. The benefits of using various ICTs in vocational education are enormous.

One significant area different technologies have penetrated deeply and revolutionized is the indispensable field of learning, education and training. Technology has revamped the educational system from the generic system of group learning to a more individualized learning, (Ugwuogo, 2019). This has proven to be more effective especially with people with disabilities e.g. autism, blindness and other physical and mental disorders. Also, individuals can learn anything and train themselves on different skillset on technology search engines “*just ask Google*”, electronic databases and social networking sites e.g. YouTube, Pin it, Reddit, etc (Ugwuogo, 2019).

Examples of these ICTs which plays remarkable and significant roles in educational administration and management according to Vermaat (2019), include the use of computers and digital devices like laptops, desktops, palmtops, tablets and smart phones, Others include printers and scanners, fax machines, projectors, online technologies and social networks through the use of blogs, Facebook, zoom, Skype, WhatsApp, Instagram, YouTube, Twitter, among others (Vermaat, 2014). There are also emerging technologies such as robotics, virtual realities, Google Docs, educational platforms (Learning Management System as Moodle), cloud computing, games, among others which can equally be utilized in any educational setting and classroom. These online emerging technologies which requires Internet connections or connectivity to function have their own benefits to users in the educational setting and classroom, (Neira, Salinas & Crosetti, (2017).

In vocational and technical education, multi-media and telematics can help develop a range of skills and behaviours in a variety of ways. They will help pupils learn how to interpret and utilize the information that is communicated in a creative and enticing way as utilized in the learning phase. The most essential level of business and technical communication requires multi-media communication and knowledge retrieval skills. Students also engage in practices that enhance higher thinking skills that include problem-solving, reflection, recognition and analysis when working with multi-media and telematics technology, since they are concerned with complex, practical content. The services include training, educating policy leaders, producers, and problem solvers for vocational and technical education students as adults in the 21st century.

In lieu of the forgoing, this study examined the Application of Information and Communication Technology ICT in Instructional delivery in Vocational and Technical Education: Barriers and prospects. The study sort to review ICT integration to support students learning, application of ICT in Vocational Education context, ICT Skills and Competencies Needed by Teachers for Quality Vocational Education Delivery, the necessities of ICT in

Vocational Education, justification for ICT based Vocational Education, barriers for integration of ICT in Vocational Education, curriculum implication, prospects/way forward, conclusion and recommendations.

Objective of the study:

The main objective of the study is to investigate the Application of Information and Communication Technology ICT in Instructional delivery in Vocational and Technical Education. Specific objectives include to examine:

- i. The use of ICT to support vocational students' learning
- ii. The use of ICT in Vocational Education context
- iii. The ICT skills and competencies needed by teachers for quality Vocational Education delivery
- iv. The barriers for integration of ICT in Vocational Education and Way Forward

Review of Related Literatures

Uses of ICT to support students' learning

Our country, which has developed excellent learning styles among students, the use of ICTs for training and realistic training is critical. The emphasis on learning and research is no doubt an important inspiration base and the foundation for creating an environment for learning ICT mediated schooling, Internet/intranet connectivity and other core areas for convergence of technology and communications technology or the exercise of vocational and technical education. The International Conference on Technology and Mediated Learning covers information and communication technology (ICT) and Computer-Aided Instruction (CAI) in regard to the vocational and technical teachers, as well as the use of immersive tools to develop progression materials and Computer Aided Learning (CAL) for their students. Other developing countries have also used computer-assisted teaching, especially in the early years of schooling.

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They offer students a variety of opportunities to improve their academic skills while encouraging teachers to progress with more software and engaging courseware. Communication is a crucial part of learning, according to studies. This is normally a negative thing in the classroom paradigm. The majority of laboratory models are "one-way teaching models," in which the teacher behaves, and the students merely respond. Computer-assisted instructions can significantly complement traditional instructional techniques, allowing students to learn in the easiest way possible, (Richa, Anuj & Anoop, 2021).

The Internet and Intranet have evolved into data and digital services rich sources. A private Internet for a selected number of people is known as an intranet. For example, an intranet is a school campus network that shares local information, including teaching and curriculum, while also having access to the Internet whereas the Internet is a global network of interconnected computers communicating over a variety of hardware platforms via protocols. Any machine on the Internet includes global knowledge - (the content of Intranet is only available to a small closed community such as school-teachers and students).

The information management Information system for education (EMIS/EDMIS) is a multi-user information system, digital information system and platform to store and retrieve educational data from colleges, grade levels, test results, schools, staff, financial institutions, and schools, the state or regional levels. Education Management Information System Demographics, information on jobs, training plans, advanced training classes completed by personnel and staff performance assessments will also be collected in uniform formats and entry at graduate, national and state levels in order to assist decision making. EMIS financial details include budgets, cash reserves, investment, payments, loan schedules and other upper-level management financial reports as well as information on building profile. Despite its widespread use in the developed world, EMIS is frequently restricted to student affairs offices in Universities and ministries of education in developing countries. Data on education preparation is typically collected by hand and is vulnerable to mistakes and inconsistency.

Uses of ICT in Vocational Education Context

Available literature has revealed that ICT has successfully been applied in the following Vocational educational dimensions (Richa, Anuj & Anoop, 2021):

- a. Studying ICT education prepares students so as to use ICT in their studies, future occupation and social life.
- b. Use of ICT as a tool that aids in the collection of data and documentation, making arraignments, projects, conducting research and communicating. The entire world has been reduced to a global village and through on-line services student access virtual library resources from any part of the world.
- c. ICT used as an instructional medium provides tools for teaching and learn itself; a medium through instruction games and simulation, educational networks, drills and practice exercises, modelling etc.
- d. ICT as a tool for the organization and management of educational environments.

(Ugochukwu, 2012), noted such application areas to include: resources management and financial control, student personnel services, admission, processing and storage of academic records etc.

ICT Skills and Competencies Needed by Teachers for Quality Vocational Education Delivery

The advent of computer and its attendant technologies has been a source of worry to the uniformed minds who feels that people would be thrown out of jobs. Teachers are not excluded from this pathetic reservation. But the truth remains that an effective and creative teacher's job will enhance in quality service delivery upon ICT application. The instrumentality of the

technologies of information and communication has significantly enriched the average teacher who can access the most current information bordering on content and pedagogy at the speed of light, (Ugochukwu, 2012), stated that for teachers to be ICT complaint, they need:

- a great pedagogical, didactical and educational psychology craftsmanship;
- subject matter mastery (in vocational content);
- a large knowledge (the application possibilities of) modern educational tools; and
- skills in student guiding processes (such as formulating assignments, projects etc) and counselling.

Again considering the fact that the new teacher is forced to collaborate with other colleagues in a way entirely different from that he was used to be requires hands on experience and skills of:

Creativity, personal relations, flexibility, logistic (assigning work and study practices and student grouping skills for working in projects, collaborative or cooperative work communication, administration and organization. The teacher should in fact be a good manager of both human and material resources and for these he needs a sound knowledge and skills of ICT, (Ugochukwu, 2012), (Richa, Anuj & Anoop, 2021).

The necessities of ICT for Vocational Education.

In ICT, the development, immersion, flexibility and engaging material is all about enhancing vocational and technical education and learning. It enables students to learn in a more personalized manner. Furthermore, the IT technology has the capability to accelerate, enhance and deepen skills, motivate and engage students in learning, assist students in linking school experiences to work practice and build economic viability for the employees of tomorrow.

Information and Communications (ICT) technology is an inextricable part of our culture. In traditional or distance education institutions worldwide, particularly in developed economies, ICT has demonstrated dramatic effects on the standard and quantity of instruction, analysis and research.

ICT thus enhances institutions' performance and efficiency, leading to a number of instruments to improve and promote the pedagogical practice of professional and technical instructors. For example, e-learning has become the popular mode of using ICT in education for students, (Yusuf, 2005); (Youssef & Dahmani, 2008). While professional and technical teachers should also take care of their students' particular interests, as in addition to traditional schooling, ICT oriented technology, such as e-learning, has a lot of potential. This is because ICT extended learning can provide new ways to achieve high standards' on cognitive tasks, including uniqueness, ingenuity, problem resolution, and teamwork, particularly by utilizing web-based technologies.

In addition to the requirements above, the following are, therefore, some of the clear and concrete reasons why ICT technology should be applied by skilled and technical teachers:

- a. Because the Internet typically provides digital documents, newspapers and similar resources, a modern ICT facility allows vocational and engineering students and instructors to access, control and use the knowledge on education and training environments (Oxfam Education Report, 2000).
- b. In Nigeria and Africa, accessibility and distance learning training would include, if well supported by e-learning expertise, a connection to, mobility and collaborative

work that could not be easily attended at universities in urban and rural communities in general. This has long-term consequences for high-quality educators and seekers of truth in any generation, place and time. Higher schools also have a responsive and accessible learning environment for students and instructors to progress on new knowledge and communications technologies.

- c. As a communal mechanism, it will foster collaboration and communication among students and teachers at both the international and local levels.
- d. It would enable people who want to work and learn at their own rate, regardless of location, to do so.
- e. It improves vocational and technical presenters' efficiency in terms of timely delivery of progression materials and provides full kindness to their pupils, which one can do by email reviews or other means.
- f. It would transform distance learning from "just-in-class" to "just-in-time," allowing for greater ease of access to education.
- g. Since it is appealing and engaging, a flexible user interface will pique the learner's curiosity, resulting in continued learning.
- h. It promotes the growth of human resources accomplished by fulfilling the demands of today's world budget, which is financed and guided by information and communication technologies.

Justification for ICT Based Vocational Education

The integration of ICT as a component of vocational curriculum is justified by its attendant benefits identified and yet to be identified.

- a. Most institutions in the society are going to become more efficient in their junctions as a result of information technology (IT) application and at some point, the primary and secondary schools will, too. This fit is just too good to ignore.
- b. ICT makes Active Learning (AL) possible. AL is an instructional approach that combines four initial elements namely;
 - i. Learning drawn from working on real problems;
 - ii. Individuals retains responsibilities for their own problems;
 - iii. It involves a group of learners who are engaged in real problems
 - iv. Includes the attempt to implement (and thereby test the) ideas developed with the action learning set.

At is therefore an effective vehicle for developing creativity as it engenders a capacity to as productivity questions and creativity most often raise from asking questions from different mind as, (Jegede, Ebio and Iroegbu, 2019).

ICT enhances the quality teaching and learning. By proper planning, we set out clear learning outcomes and suitable teaching methods to achieve them.

- i. ICT guarantees wider access and readership to learnable materials ride the use of internet possibilities.
- ii. ICT guarantees large group workshops that is, the application and use which are used to provide people with practice and hands on experiences of using information and ideas delivered by other means.

- iii. Technological development- IT offers unparalleled opportunities for information dissemination at relatively low cost.
- iv. There would be more variety on the student's learning that there is at present where lecture and seminars dominate the teaching processes students will devote time to independent learning made possible by on-line facilities.

Barriers in the Use of ICT in Vocational Education

Five main challenges according to (Shehu 2015) are presented as follows:

Infrastructure: Appropriate infrastructure is needed to ensure content delivery and equality of access. *Administration:* Sufficient resources and support for technology adoption must be provided by the system. *Learning:* The use of ICTs should be for better education and awareness. *Teaching:* Educators must be properly trained to instruct and support students' learning using ICTs.

Content Creation: Content development is time-consuming and expensive, and the content itself has a limited shelf life. Vocational education faces a significant challenge in developing and maintaining high quality.

While the technology-enhanced curriculum has a lot of potential, it also has some immediate drawbacks, such as capital investments in software programs and computer hardware, equivalent allowance to remove technical "haves" and "have-nots," suitable methods for mixing skill into curricular, patent problems, and a lack of educationally complete content. Moreover, for most teachers, introducing technology-enhanced learning is a major challenge because information technologies are both thrilling in their abilities and discouraging resulting from the doubt formed by the swiftness of transition.

Institutional Restrictions: In the literature, institutional obstacles to ICT-mediated learning have been well established. Some of the obstacles are as follows: lack of resources and assistance; scheduling difficulties; insufficient funding; high curriculum creation costs; instructional challenges; difficulties finding trained teachers; and difficulties maintaining dependable technical assistance and support.

Student Obstacles: Distance education students face a variety of challenges which include: the cost of apparatus and access to skill; inspiration; an absence of instant input from instructors; an insufficient level of funding and facilities; isolation in addition to alienation; a lack of ICT knowledge; and an absence of facts and time management skills

Curriculum and Content: Although much emphasis is placed on the creation of skills that support information and communication technology-facilitated learning, what is found to be the most pressing concern is its curriculum material

Efficacy and Appropriateness: It's a widespread belief that education via distance learning is ineffective in providing vocational and technical skills. However, it is much easier to provide distance education in the cognitive and affective domains than teaching manual skills at a distance. Through the updating and enhancement of learning skills, instructional strategy, adaptive learning representations, simulation of office climate, student support systems, allowance for e-learning, and the advancement of intelligent training, the effectiveness of distance learning in vocational education will continue to increase. The effectiveness of distance learning will be strengthened further by a greater focus on self-directed learning and an upsurge in computer learning among participants.

Curriculum implication/Policy Imperatives

The relevance of ICT in Vocational Education has been elucidated in this study. Equally, some issues critical to its effective integration were identified as a way of ensuring quality objectives

of the innovation. It is therefore pertinent to outline the following implicit curriculum implications and policy imperatives in tandem with (Richa, Anuj & Anoop, 2021):

- a. School authorities, teachers of vocational subjects and other stake holders should demonstrate honest commitment to the innovation devoid of mere lip service.
- b. Regular seminars, workshops and tutorials can be adopted as a means of improving the ICT skills and competencies of Vocational teachers.
- c. Time scheduling should accommodate extra “time out”
- d. The Programme of ICT should not be by arrangement or its implementation by “crash approach” but should be integral to entire education delivery system.
- e. Instructional Design Approach (IDA) should be adopted in integrating ICT in the schools vocational programmes.
- f. The Administrators of our education system need to be more committed to ICT policy implementation by the provision of requisite enablement.
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- l. The Administrators of our education system need to be more committed to ICT policy implementation by the provision of requisite enablement.

Way Forward

- a. The government with the financial assistance from other bodies like the private sector, PTA, NGOs and financial institutions, should support schools through adequate provision of ICT infrastructure and resource provision in order to aid utilization of different ICTs in the Vocational Education and schools. (Jegede, Ebio& Iroegbu, 2019) equally opined that the government should provide more ICT facilities to all the basic schools to enable the schools to deploy ICT facilities for teaching and learning in the classroom.
- b. The government should increase the funding of schools through adequate budgetary the private sector and Non-Governmental Organizations (NGOs), voluntary agencies and international organizations should be encouraged to support the funding of UBE for effective utilization of ICT in the programme. The above statement is in line with the statement of (Jegede, Ebio and Iroegbu, 2019) who noted that the government should increase the funding of ICT education in all the basic schools across the country. Moreover, the 26% recommended by UNESCO to be allotted to education sector must be taken into consideration.
- c. The teacher-related problems and hindrances to ICT utilization in vocational education can be resolved through adequate teacher motivation, empowerment to boost their skills and teacher capacity building and development, among others. (Shehu, 2015) remarked that special capacity building workshops/seminars that provide hands-on and minds-on opportunities for all participants should be organized for in-service teachers in primary and secondary schools to build capacity at the Basic

education level. The central focus of the workshop should be practical application of ICTs in the classroom. In the same vein, talks, shows and discussions should be incorporated in the seminars to change the attitudes and mind-sets of in-service teachers about ICTs in teaching. Likewise, policy and curriculum provisions backed by infrastructural supplies for use of technologies to train teachers; including the application of Educational Technologies in microteaching and teaching practice at the initial teacher preparation stage; and promoting teachers' easy access to ICT devices, will aid to control the teacher-related factors hindering utilization of ICTs in Vocational and Technical Education.

- d. School administration factors should be resolved through the following means of employing effective maintenance strategies such as the preventive, routine, predictive and emergency strategies, for facility management in school; providing adequate support for teachers utilization of ICT in school through organization of capacity building programmes (like workshops, conferences, seminars, etc), effective monitoring and supervision of instructions, etc; and building/strengthening collaborations and partnerships with the school community in order gain their support towards their sponsorship, provision, development and maintenance of ICTs in school which will encourage their utilization.
- e. The government and other education stakeholders like the PTA, private individuals and investors should support schools in the procurement of ICT facilities for their utilization in the UBE programme. (Jegede, Ebio and Iroegbu, 2019) opined that the government should also subsidize ICT facilities for teachers and students to enable them to buy their personal systems. Also, school administrators should ensure that they upgrade ICT facilities and resources in the school for their elasticity and durability.

Conclusion

It has been established that ICT assists to facilitate both instructional and learning process and has great influence on the teaching and learning processes in Vocational and Technical Education. It provides opportunity for personalized, flexible and asynchronous learning and shifts the learning from teacher centred to student centred and hence is a catalyst for reforms about classroom, educational institute, community and system. It enhances the learning of the students, helps the students to learn new skills set, promotes social mobility, helps the students to compete in a worldwide economy, and thus has a multiplier effect across the education system (UNESCO, 2014), (Youssef & Dahmani, 2008).

Therefore, incorporating information and communication technology (ICT) into vocational and technical education and the educational system has a vast range of consequences for teaching and learning. ICT has enormous potential in developing vocational and professional teaching and learning content. Therefore educators have to be mindful in incorporating ICT into the educational transfer framework. However, this may result in typical guidance problems that come with reform, as it is, after all, an invention. Therefore, educators must be able to balance the advantages and disadvantages of embracing ICT as a tool.

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