Proceedings of the 34th Annual National Conference of Technology Education Practitioners Association of Nigeria

(Formerly Nigerian Association of Teachers of Technology, NATT)

Theme:
COVID-19 Pandemic: A Challenge to Technical Vocational Education and Training (TVET)

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Proceedings of the 34th Annual National Conference of Technology Education Practitioners Association of Nigeria

(Formerly Nigerian Association of Teachers of Technology, NATT)

Theme:
COVID-19 Pandemic: A Challenge Technical Vocational Education and Training (TVET)

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PREFACE

GOMBE 2021 is the 34th edition of the Technology Education Practitioners Association of Nigeria (formerly Nigerian Association of Teachers of Technology) Annual National Conference. The essence of this conference is to establish a place where technical teacher educators, TVET experts, educational administrators, industry experts, government agencies and other academic researchers brainstorm and chart a way forward on improving the TVET and technical teacher educational systems in Nigeria. In view of the above and with due consideration to the prevailing restrictions due to COVID-19 pandemic, **GOMBE 2021** goes dual in its modes presentations; that is, live virtual/video recorded webinar and in-person parallel plenary sessions.

Keynote speech comes up on the occasion of the live virtual conference opening ceremony. Lead paper presentations from leaders in various fields are normally scheduled at the beginning of each conference day's activities and during the lunch break in segmented webinar plenary sessions. Exhibitions from various companies in the industry and the conference sponsors are showcased on the conference live virtual platforms and broadcast channels throughout the event. Interlaced parallel live virtual sessions would feature onference paper presensations which cut across tutorials, technical paper sessions, and panel discussions scheduled on various topics and subject areas within TVET and Technology Teacher Education throughout the event. Over the years focus areas included Educational Infrastructure, Innovative Approaches to TVET, Global Economic Depression Insecurity and Security Intervention Strategies for Sustainable Development in Nigeria as they impact on educational administrative processes.

The Executive Council of the Technology Education Practitioners Association of Nigeria under the leadership of Prof. R. O. Okwori chose the theme of the 34th Annual National Conference of the association as ***COVID-19 Pandemic: A Challenge toTechnical Vocational Education and Training (TVET)***. This year's conference is locally organised at the Multipurpose Hall, Federal College of Education (Technical), Gombe, Gombe state. In line with the New Normal global practices due to COVID-19 pandemic, this year's conference was hosted in dual modes. Delegates had the options to either participate in–person or get connected synchronously via virtual platform virtual platform. While presenting virtually, each presenter may share their computer screen either using PowerPoint or Prezi. For virtual pre-recorded presentation, the Organising Committee plays the desired pre-recorded (audio/video) poster or PowerPoint presentation in its allocated slot. After the conference the complete conference proceedings containing all papers presented and other media files are published on our publication site.

Therefore, it is my pleasure to present to you **GOMBE 2021** Book of Proceedings as an invaluable reference material based on the following sub-themes: *Policy and Legislature in TVET in the Era of COVID-19 Pandemic, Content Development of in the Era of COVID-19 Pandemic, TVET and Public Private Partnership in the Era of COVID-19 Pandemic, Entrepreneurship in TVET in the Era of COVID-19 Pandemic, Funding of TVET in COVID-19 Pandemic, Science Technology and COVID-19 Pandemic* . Finally, we are most sincerely express our gratitude to all participants and our sponsors for partnering with TEPAN to blend outputs from academic researches, reports, industrial experiences and lessons learned in the field implementations and cutting-edge technologies. Our special thanks go to the local organizing committee, pricipal hosts, powered technology and other Editorial Committee members for their respective valuable time and effort for making **GOMBE 2021** a success.

Dr. J. M. Mafwalai
Editor – in – Chief

Proceedings of the 34th Annual National Conference of Technology Education Practitioners Association of Nigeria

(Formerly Nigerian Association of Teachers of Technology, NATT)

On COVID-19 Pandemic: A Challenge to Technical Vocational Education and Training (TVET)

SUB – THEMES:

1. **Policy and Legislature in TVET in the Era of COVID-19 Pandemic**
2. **Content Development of TVET in the Era of COVID-19 Pandemic**
3. **TVET and Public Private Partnership in the Era of COVID-19 Pandemic**
4. **Entrepreneurship in TVET in the Era of COVID-19 Pandemic**
5. **Funding of TVET in COVID-19 Pandemic**
6. **Science Technology and COVID-19 Pandemic**

TABLE OF CONTENTS

	Content	Page
	TITLE PAGE	i
	COPYRIGHT PAGE	ii
	ATEPAN EDITORIAL BOARD	iii
	TEPAN EXECUTIVE COUNCIL	iv
	PREFACE	v
	SUB–THEMES	vi
	TABLE OF CONTENTS	vii
	NATIONAL PRESIDENT'S WELCOME ADDRESS	x
	KEYNOTE ADDRESS	xiii
	LEAD PAPER	xxii
	SUB-THEME (1):	1
	Policy and Legislature in TVET in the Era of COVID-19 Pandemic	
1.	TRANSFORMATIONAL LEADERSHIP IN TVET SECTOR: A PANACEA TO COVID-19 CHALLENGES IN NIGERIA **A. G. Udofia & I. S. Haladu**	2
2.	UNDERSTANDING THE CONTEXT OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN NATIONAL DEVELOPMENT **S Hamman**	8
3.	DIGITAL SKILLS REQUIREMENT FOR SAFE AND EFFICIENT CONTENT DELIVERY OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN PUBLIC UNIVERSITIES IN RIVERS STATE DURING COVID-19 PANDEMIC **P. C. Okwelle & I. Samuel**	14
	SUB-THEME (2):	24
	Content Development of TVET in the Era of COVID-19 Pandemic	
4.	OPEN AND DISTANCE LEARNING: THE NIGERIA EDUCATION STRATEGY **S. U. Ombuguhim**	25
5.	FACTORS AFFECTING PSYCHOSOCIAL WORK, ERGONOMIC RISK AND CUMULATIVE TRAUMA DISORDER OF WORKERS AT CONSTRUCTION SITES IN NORTH-EAST, NIGERIA **P. S. Yaduma, A. S. Bappah & G. M. Kwami**	38
6.	INNOVATIVE CONTENTS DELIVERY FOR TECHNICAL VOCATIONAL EDUCATION AND TRAINING PROGRAMMES IN THE ERA OF COVID-19 PANDEMIC **U. N. Lawan, S. Ibrahim & B. G. Fagge**	44
7.	COMPETENCY NEEDS IMPROVEMENT FOR EFFECTIVE CONTENT DELIVERY IN THE ERA OF COVID-19 PANDEMIC AMONG OF ELECTRICAL/ELECTRONICS LECTURERS IN COLLEGES OF EDUCATION IN NORTH-EASTERN NIGERIA **D. Moses & I. J. Ibanga**	49
8.	EMPLOYABILITY SKILLS AMONG FEMALE STUDENTS IN TERTIARY TECHNICAL AND VOCATIONAL EDUCATION INSTITUTIONS IN NORTH-EAST, NIGERIA **B. A. Mustapha, A. B. Abubakar & M. M. Kano**	59

TABLE OF CONTENTS

	Content	Page
9.	DETERMINANTS OF CAREER PREFERENCE AMONG STUDENTS OF TECHNICAL AND VOCATIONAL EDUCATION IN COLLEGES OF EDUCATION IN NORTH-EAST, NIGERIA **V. V. Apagu & B. A. Wakili**	64
10.	TEACHERS' PERCEPTION ON GREENING TVET PROGRAMES TOWARDS GREEN SKILLS ACQUISITION IN THE ERA OF COVID-19 PANDEMIC FOR SUSTAINABLE DEVELOPMENT IN NIGERIA **B. Abubakar, I. Buba & B. A. Wakili**	72
11.	INNOVATIVE TECHNOLOGIES AND SUSTAINABLE E-COMMERCE IN COVID-19 PANDEMIC ERA **G. K. O. Okereke*, et al.,***	76
	SUB-THEME (3): **TVET and Public Private Partnership in the Era of COVID-19 Pandemic**	83
12.	PUBLIC-PRIVATE-PARTNERSHIP FOR IMPROVING TECHNICAL VOCATIONAL EDUCATION AND TRAINING DELIVERY IN THE ERA OF COVID-19 PANDEMIC IN NIGERIA **O. S. Olabiyi**	84
13.	IMPROVING ELECTRICAL/ELECTRONIC STUDENTS' SKILLS ACQUISITION IN THE POLYTECHNICS IN OYO STATE THROUGH COLLABORATION WITH THE INDUSTRY FOR SUSTAINABLE DEVELOPMENT IN THE ERA OF COVID-19 **S. A. Adedeji**	95
	SUB-THEME (4): **Entrepreneurship in TVET in the Era of COVID-19 Pandemic**	104
14.	IMPACT OF COVID-19 PANDEMIC ON BLOCK/BRICK MANUFACTURERS IN SHAMAKI/BAJOGA WARD OF GOMBE LOCAL GOVERNMENT AREA **S. M. Yidi & S. A. Ningi**	105
15.	IMPACT OF COVID-19 PANDEMIC ON THE MANUFACTURING SECTOR PERFORMANCE IN NIGERIA **S. K. Bakle, D. T. Francis & H. J. Longchi**	112
16.	COGNITIVE COMPONENT OF PRE-SERVICE TECHNICAL TEACHERS' ATTITUDES TOWARDS ENTREPRENEURIAL EDUCATION IN NIGERIA **M. M. Kano**	122
17.	PRACTICAL SKILL RETRAINING COMPETENCIES OF TECHNICAL COLLEGE STUDENTS IN COMPUTER HARDWARE TROUBLE SHOOTING AND MAINTENANCE FOF EFFECTIVE ENTREPRENEURSHIP **J. M. Dawha & M. H. Ya'u**	127
18.	DIGITAL ENTREPRENEURIAL SKILLS NEED OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING UNDERGRADUATES IN THE ERA OF COVID-19 PANDEMIC **N. Umar, M. Bello, I. M. Sabo & A. M. Ningi**	134
19.	EFFECTIVENESS OF ENTREPRENEURSHIP EDUCATION IN TERTIARY TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN THE ERA OF COVID-19 PANDEMIC **R. O. Okwori, S. N. Yisa & M. J. Mustapha**	142

TABLE OF CONTENTS

	Content	Page
	SUB-THEME (5):	149
	Funding of TVET in COVID-19 Pandemic	
20.	EFFECTIVE FUNDING OF TVET: A POTENT TOOL FOR SUSTAINABLE DEVELOPMENT IN THE ERA OF COVID-19 IN NIGERIA **O. L. Obierika**	150
21.	FUNDING OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN THE ERA OF COVID-19 PANDEMIC IN NIGERIA: ISSUES AND STRATEGIES **I. M. Sabo & B. Njidda**	158
22.	FUNDING CONSTRAINTS OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING AGAINST EFFECTIVE UTILISATION OF INNOVATIVE DIGITAL LEARNING PLATFORMS DURING THE COVID-19 PENDEMIC **M. Lawal & F. O. Adesanya**	162
	SUB-THEME (6):	168
	Science Technology and COVID-19 Pandemic	
23.	COVID-19 PANDEMIC: A CHALLENGE TO TEACHING OF AGRICULTURAL SCIENCE AND TECHNOLOGY EDUCATION ACROSS THE HIGHER EDUCATION INSTITUTIONS IN NIGERIA **M. Ahmed, D. Hamidu & A. M. Gidado**	169
24.	EFFECT OF LEARNING STYLES ON STUDENTS' ACADEMIC ACHIEVEMENT ON SERVICE STATION MECHANICS MODULE AT TECHNICAL COLLEGE LEVEL IN ADAMAWA STATE **E. B. Enoch, D. K. Diraso & C. A. John**	173
25.	IMPROVING INSTRUCTIONAL DELIVERY IN TECHNICAL VOCATIONAL EDUCATION AND TRAINING FOR SKILLS DEVELOPMENT IN THE ERA OF COVID-19 PANDEMIC IN NIGERIA **C. P. Eze, C. O. Igwe & A. O. Nwachukwu**	179
26.	IMPACT OF AUTOCAD ON ACQUISITION OF SCIENCE PROCESS SKILLS AMONG BASIC TECHNOLOGY STUDENTS IN COVID-19 PANDEMIC IN NIGER STATE **A. M. Hassan, M. S. Mannir & B. K. Umar**	186
27.	PERCEIVED EFFICACY OF VIRTUAL INSTRUCTION DURING THE COVID–19 PANDEMIC LOCKDOWN AMONG THE TEACHERS IN GOVERNMENT SCIENCE AND TECHNICAL COLLEGES IN GOMBE STATE **A. Taiye, Y. P. Aliyu, A. S. Idaya & N. A. Jidda**	192
28.	IMPACT OF COVID-19 PANDEMIC ON CONTENT DELIVERY OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN PUBLIC TERTIARY INSTITUTIONS IN NORTH-CENTRAL STATES OF NIGERIA **A. M. Agada & P. S. Yaduma**	198
29.	COVID-19 PANDEMIC: A NECESSITY FOR VIRTUAL LEARNING IN NIGERIAN HIGH INSTITUTIONS **A. H. Usman & I. Alhassan**	204

WELCOME ADDRESS BY NATIONAL PRESIDENT OF TECHNOLOGY EDUCATION PRACTITIONERS ASSOCIATION OF NIGERIA (FORMERLY NIGERIAN ASSOCIATION OF TEACHERS OF TECHNOLOGY)

PROFESSOR ROBERT OGBANJE OKWORI FNATT, FHRD

AT THE OPENING CEREMONY OF THE 34TH ANNUAL NATIONAL CONFERENCE OF THE ASSOCIATION HELD AT FEDERAL COLLEGE OF EDUCATION (TECHNICAL), GOMBE, ON MONDAY 20TH OCTOBER, 2021

Protocols

Distinguished guests, respected colleagues, ladies and gentlemen

It is with great pleasure and honour that I welcome all of you to 34th Annual National Conference of the Technology Education Practitioners Association of Nigeria (TEPAN) formerly called Nigerian Association of Teachers of Technology (NATT). I sincerely appreciate the Almighty God for granting us safe trip to Gombe, Gombe State. I am delighted to welcome you to this Opening Ceremony holding here today at Federal College of Education (Technical), Gombe.

We sincerely appreciate the presence of the distinguished personalities here who have made sacrifice to create time to grace this annual occasion of the Association. Today, we are privilege to have the Chairman of this Opening Ceremony His Excellency Ambassador (Alhaji) Ibrahim Yerima Abdullahi (*Sarkin Bai, Gombe*) who is a seasoned administrator and renowned technocrat of high repute. Also we deeply appreciate the presence of the keynote presenter Professor Hassan Bello (*Dan Isan Doma*), The Dean Faculty of Technology Education, ATBU Bauchi; The Workshop facilitator, Professor S. M. Yalams, and the Lead paper presenter Dr Hassan N. Muhammad (Dean, Students' Affairs Federal College of Education (Technical), Potiskum. I want to specially recognize and appreciate the encouragement, love and hospitality of Dr Ali Adamu Boderi (*Muqaddam*) the Provost of this great college and his Management team for giving us the permission to hold this conference here. We sincerely appreciate the members of the Local Organizing Committee for their relentless effort that made this conference a reality.

We are also grateful to have the former Presidents, Fellows of TEPAN, other dignitaries, Professors and all our academic fathers and leaders here today physically and virtually for Gombe 2021 TEPAN Annual National Conference.

We are gathered here today physically and virtually to address the cogent issues surrounding the theme **"COVID-19 PANDEMIC: A CHALLENGE TO TVET".**

The sub-themes are:

- Policy and Legislature in TVET in the Era of COVID-19 Pandemic.
- Content Development of TVET in the Era of COVID-19 Pandemic.
- TVET and Public Private Participation (PPP) in the Era of COVID-19 Pandemic.
- Entrepreneurship in TVET in the Era of COVID-19 Pandemic.
- Funding of TVET in the Era of COVID-19 Pandemic.
- Science , Technology and COVID-19 Pandemic.

After a thorough logical research investigation and critical brainstorming effort, we arrive at the above theme and sub themes in response to meet the critical demand for a functional TVET system in the era of COVD-19 pandemic which has greatly hindered smooth TVET delivery system and skikk acquisition in recent times. Restoring a functional TVET system and enhancing continuous skills acquisition and technological development in Nigeria necessitate the need to research into COVID-19 PANDEMIC: A CHALLENGE TO TVET.

TVET, according to the National Policy on Education, is an aspect 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. TVET provides 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 as well as impart the necessary skills to individuals who shall be self-reliant economically. Institutions in Nigeria running TVET programmes include universities, polytechnics, colleges of technology, monotechnics, technical colleges, vocational schools and vocational training centres among others. Technical colleges are regarded as one of the principal TVET institutions in Nigeria for the training of craftsmen and women.

Recently, TVET is considered a potent tool for rapid sustainable technological development and economic advancement in Nigeria because research findings revealed that many developed countries of the world have recognized the great importance attach to TVET programmes and have therefore accorded it the attention it deserves. They have regarded it as the basis for industrial, technological and economic advancement. TVET is a means to job creation, poverty reduction, a tool for technological and economic development. Several countries that have experienced technological and economic breakthrough in the world today are those that have placed great emphasis on TVET and have invested substantially on TVET through proper planning and reasonable TVET implementation policy. For example, the Dutch school system provided compulsory technical education for one-third of its pupils between the ages of 14 and 16 years. The Dutch provided Technical training centers in secondary or high schools offering technical training for lifelong trade together with general academic studies. India, Asia and several developed countries have invested heavily in TVET and the benefits are very glaring with a great impact on their technological and economic development.

While the USA in recognition of the importance of TVET, established public technical secondary schools that introduced extensive public instruction in vocational agriculture associated skill-based courses. In the past decade, the developed countries have shifted emphasis to ICT- driven TVET. Countries that have developed their TVET programmes are said to be secured technologically and economically. They have also been able to produce innovative and productive workforce for sustainability as a major driver of sustainable economic growth and development. Despite the laudable role of TVET in enhancing sustainable technological and economic development, the outbreak of COVID-19 pandemic created an obstacle to effective instructional delivery in TVET institutions in Nigeria.

COVID-19 is an infectious disease caused by a novel coronavirus which originated from Wuhan, China in December 2019. Initially, the perception of people was that the COVID-19 pandemic would be localized and remains in China only. It later spread across the world rapidly through the movement of people and goods. On a daily basis, COVID-19 is spreading across the world at an exponential rate and killing people at an alarming rate. The coronavirus epidemic was declared a pandemic by the World Health Organization (WHO) in March, 2020 because the illness is affecting a very large population, and spreading from a community to several countries across the world at a faster rate.

The World Health Organization in 2021 reported that the confirmed cases of COVID-19 globally is tens of millions including deaths in millions and the number is still counting in some cold regions of the world. According to the International Labour Organization (ILO) (2020), the coronavirus outbreak led the governments of many countries including Nigeria to impose restrictions on non-essential travel to countries affected by COVID-19, indefinitely suspending tourism travel, work visas and immigrant visas and closing of schools and training centres.

The COVID-19 spreads faster from contact with infected persons, infected surfaces or infected environment and most people infected with the COVID-19 virus will experience respiratory illness. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. Since COVID-19 is killing and ravaging lives on a daily basis in large numbers, the lockdown and stay at home order has become the order of the day for several months in 2020 and this has created serious economic hardship in Nigeria. It is obvious that, the COVID-19 pandemic has created serious economic hardship and pain in several countries and across various sectors.

The economic pain became severe as several countries and states imposed lockdowns and people were asked to stay at home, and the severity was felt in various sectors of the economy with travel bans affecting the aviation industry, sporting event cancellations affecting the sports industry, the prohibition of mass gatherings affecting the events and entertainment industries has negative impact on the Nigerian economy. One of the major impact of COVID-19 on the Nigerian economy is the closure of Technical and Vocational Education and Training (TVET) institutions and training centres where teaching and learning on skills acquisition are carried out to produce skilled professionals like artisans, craftsmen, technicians and technologists among others.

Prior to COVID-19 pandemic, teaching, learning and skill acquisition in Nigerian TVET institutions and training centers was basically through face to face physical contact with teachers and learners. The imposition of lockdowns and stay at home order led to the closure of TVET institutions, thereby hindering teaching, learning and skill acquisition in TVET programmes. The long months of lockdown and closure of TVET institutions has led to a drastic shortage of skilled men and women in the Nigeria society. Even though schools have reopened now in Nigeria, it is wise to take a proactive measure to prepare TVET teachers and TVET practitioners on the 21st century skills needed to combat the challenges created by COVID-19 pandemic to effective instructional delivery and skills acquisition in TVET institutions. It is therefore appropriate at this time to research into "COVID-19 PANDEMIC: A CHALLENGE TO TVET".

Your Excellency, Ladies and Gentlemen, permit me on behalf of our Great Association to admit a distinguished personality who has made outstanding contributions to our economy into the prestigious professional fellowship cadre. He is Engr. (Dr.) F.O.N. Onyeukwu.

Once again, I sincerely welcome you all to this 34th TEPAN Annual National Conference.

Thank you for your time and God Bless you all.

Long live, the Federal Republic of Nigeria

Long live, Technology Education Practitioners Association of Nigeria

God Bless you all

Professor Robert Ogbanje Okwori, *FNATT*

National President

COVID-19 PANDEMIC: A CHALLENGE TO TECHNICAL VOCATIONAL EDUCATION AND TRAINING

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BEING A KEYNOTE ADDRESS DELIVERED AT AT THE OPENING CEREMONY OF THE 34TH ANNUAL NATIONAL CONFERENCE OF THE ASSOCIATION HELD AT FEDERAL COLLEGE OF EDUCATION (TECHNICAL), GOMBE, ON MONDAY 20TH OCTOBER, 2021

Protocols

- ✓ The Chief-host: Provost FCE (T), Gombe: Dr Ali Adamu,
- ✓ The National President of TEPAN: Prof. R. O. Okwori,
- ✓ The Chairman and Members of the Local Organizing Committee,
- ✓ Principal Officers of the College,
- ✓ Distinguished Dignitaries,
- ✓ Members of the Academia,
- ✓ Ladies and Gentlemen.

Introduction

I feel greatly honoured to welcome you all to the 34th Annual National Conference **(GOMBE 2021)** organized by the Technology Education Practitioners Association of Nigeria (TEPAN). I am indeed highly delighted to stand before this gathering to present the Keynote Address to group of vibrant and promising members of our prestigious Association. As you are all aware, the theme of the Conference is:

COVID-19 PANDEMIC: A CHALLENGE TO TECHNICAL VOCATIONAL EDUCATION AND TRAINING.

COVID-19 is first and foremost a health crisis. Many countries have decided to close schools, colleges and universities. The crisis crystallizes the dilemma Government is facing (between closing schools to reduce contact and save lives or keeping them open to allow workers go to work in order to maintain the economy). The severe short-term disruption is felt by many families around the world: home schooling is not only a massive shock to parents' productivity, but also to children's social life and learning. Teaching is moving online, on an untested and unprecedented scale. Students' assessments are also moving online, with a lot of trial and error and uncertainty for everyone. Many assessments have simply been cancelled. Importantly, these interruptions will not just be a short-term issue, but can also have long-term consequences for the affected cohorts.

Despite that the countries have returned to unrestricted movement; the shadow of the Covid-19 pandemic still looms. Hence the theme of this conference COVID-19 Pandemic: A Challenge to TVET. In this keynote address attempt would be made to trace the cause and origin of the Pandemic, how it spread, how dangerous is it, and the Nigeria's experience of the outbreak. Also, attempt would be made to look into some of the major challenges of Technical Vocational Education and Training (TVET) in Nigeria before the Pandemic and amid the Pandemic.

Cause and origin of Coronavirus

Readers will be aware that the outbreak of the novel coronavirus began in Wuhan, China, in late December 2019, and spread exponentially due to increasing urbanisation and frequent international travel, allowing for the uninterrupted transmission of the infectious disease (Alirol, *et al.*, 2011). The first reported case in the United States was on 20th January 2020, while the first cases in the United Kingdom was detected on 31st January 2020 (Moss, *et al.*, 2020). The World Health Organization named the disease caused by this Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) as COVID-19 on 11th February 2020 (World Health Organization, 2020a), and subsequently labelled it a pandemic on 11th March 2020 (World Health Organization, 2020b). On 2nd April, 2020 the number of cases reported worldwide crossed one million, with 205 countries and territories affected (Worldometer, 2020). As part of governments struggle to contain the vicious spread of Covid-19, over one third of the world's population were placed under some form of lockdown, the effects the virus has had on people's daily lives is clearly like nothing most people have experienced before. One of the many affected sectors is education. In most countries of the world, the majority of schools and colleges had suspended face-to-face teaching by 17th March, 2020, forcing students to move to online distance learning for an indefinite future(Kaplan, *et al.*, 2020).

Pandemics are not new occurrence

Covid-19 is likely to be the first which current students are affected by. But, it is not the first Pandemic in history. LeDuc and Barry (2004) documented a 20-year smallpox pandemic that started in 166 AD and more recently the world experienced the 2003 Severe Acute Respiratory Syndrome, and in 2009, H1N1 swine flu pandemic (Collignon, 2011). Lessons and experiences can be drawn from the previous crises to help us adapt and continue education. For example, web-based learning was already successfully used in the 2003 pandemic and is once again being used to minimize the reduction in education that students received to great effect (Lim, 2020).

The Spread of the Virus

In the past, several infectious disease outbreaks have been traced to viruses originating in birds, pigs, bats and other animals that mutated to become dangerous to humans. So, many health experts believe that the new strain of coronavirus likely originated in bats or pangolins and changed (mutated) so it could cause illness in humans (World Health Organization, 2019). The first transmission to humans was in Wuhan, China. Since then, the virus has mostly spread through person-to-person contact. As research continues, future studies may reveal how and why the coronavirus evolved to cause pandemic disease.

Nigeria's experience of COVID-19

Nigeria is part of the worldwide pandemic of coronavirus disease. The first confirmed case in Nigeria was announced on 27th February 2020, when an Italian citizen in Lagos tested positive for the virus, a second case of the virus was reported in Ewekoro, Ogun State, a Nigerian citizen who had contact with the Italian citizen (National Centre for Disease Control, 2021). The pandemic came with lots of drama and hardship: Nigerians were forced to stay locked down when the recorded numbers of infection from the Novel pandemic started to increase on a daily basis; During this period Schools, Churches, Businesses, Markets, sports, restaurants, social events and offices were closed down; Only few essential service providers were let to go about saving and serving mankind. These include security, media outfits and health centres. Hunger was just at sight when prizes of foodstuff began to rise and the cost of transportation went high. Then came the so much announced palliatives for the assistance of the citizens while they remained in their homes locked down. In many cases, the palliatives were far from reality.

How dangerous is the pandemic?

The outbreak of Covid-19 has been sudden. This makes it difficult to estimate the exact rate of mortality. As of 3rd May 2021, 3,204,107 deaths have been attributed to COVID-19 worldwide. While, 89,703,705 people have survived the illness *(This information comes from the Covid-19 Global Cases map developed by the Johns Hopkins Centre for Systems Science and Engineering)*. Similarly, as at 14th June 2021, Nigeria has recorded 167, 066 confirmed cases and 2,117 Death cases. What then are the common symptoms of the disease?

COVID-19 symptoms

An Infectious disease expert Lauren, & Sauer (2019) while explaining the advances in Covid-19 treatments and how knowledge of Covid-19 can assist in preventing further spread of the virus, listed the following as some of the major symptoms of the Pandemic:

- ✓ Cough
- ✓ Fever or chills
- ✓ Difficult breathing
- ✓ Muscle or body aches
- ✓ Sore throat
- ✓ New loss of taste or smell
- ✓ Diarrhea
- ✓ Headache
- ✓ New fatigue
- ✓ Nausea or vomiting
- ✓ Congestion or runny nose

Incubation period and diagnoses

Symptoms show up in people within two to 14 days of exposure to the virus. Covid-19 is diagnosed through a laboratory test. Diagnosis by examination alone is difficult since many Covid-19 signs and symptoms can be caused by other illnesses. Some people with the coronavirus do not have symptoms at all (Moss, *et al.,* 2020).

Preventive measures

Finding effective ways to prevent the spread of Covid-19 remains a global challenge. With the availability of vaccinations Governments, public bodies, and other organizations are taking measures to prevent the spread. The Centre for Disease Control and Prevention (National Centre for Disease Control, 2019) recommend the following precautionary measures:

- Mask-wearing,
- Physical distancing
- Washing hands regularly
- Staying at home to avoid contact with infected persons
- Keeping surroundings as clean as possible
- Avoid sharing of household items.
- Taking the antiviral vaccinations.

The Covid-19 outbreak has disrupted the lives of many people across the world. The worldwide rapid increase of infected cases has created a sense of uncertainty and anxiety about what is going to happen. It has also caused a tremendous level of stress among the staff and students of Institutions. This stress may lead to unfavourable effects on the learning and psychological health of students. This paper now wants to look at some of these challenges and how they affect TVET in Nigeria's context.

What TVET is all About

For this Keynote to meaningfully address the challenges of Covid-19 Pandemic on TVET, it will be of great importance to refresh our mines about what TVET is all about. Okoye and Etwelle (2014) describe TVET as the process of training designed to give knowledge, develop skills and abilities that could lead to the development of mental alertness and right attitude to life. The principal objective of TVET is to train youths and adults alike, by preparing them for the ever-changing labour market.

Based on the National Policy on Education, the components of TVE are imbedded into the Nigerian educational system. From the basic, post–basic and tertiary level emphasis are that the system should have mechanisms for skill development, attitude of productivity for self-reliance and national development. In the basic educational levels that span from primary school to junior secondary school, there are prevocational subjects taught to pupil to create an awareness. At the post-basic level, there are compulsory subjects, that are for general knowledge and field of study subjects, that students are to pick in accordance with their interest and performance. While, at the tertiary level, there is also, array of vocational and technical subjects that are compulsory for students to pick from for specialization and certification in accordance with the designated trades. The essence is to place emphasis on skill development and entrepreneurship. These trade subjects and their curriculums are carefully prepared to be practical in nature to ensure the achievement of their set goals and objectives (Federal Republic of Nigeria, 2005).

TVET is regarded as the most effective means of empowering the citizenry to stimulate sustainable national development, enhance employment, improve quality of life, reduce poverty, limit the incidence of social vices due to joblessness and promote a culture of peace the citizenry. At this juncture, it should also be noted that, Nations like Japan, China, USA and Germany were industrially successful as a result of consistent investment in TVET for their citizens (UNESCO, 2016).

In Nigeria the story is a little bit different. This system of education suffers implementation problems in the trends of its development. For instance, successive Governments of Nigeria in its response to global reforms in the social and economic context, gradually adopted the following Programmes that are in line with the TVET objectives: Operation Feed the Nation (OFN), Green Revolution (GR), Better Life for Rural Women (BLFRW), Family Economic Advancement Programme (FEAP), War Against Indiscipline (WAI), Structural Adjustment Programme (SAP), National Directorate of Employment (NDE), National Poverty Eradication Programme (NAPEP), National Economic Empowerment and Development Strategy (NEEDS) and N-POWER.

The core elements of these programmes are value re-orientation, poverty eradication, and job/wealth creation. Unfortunately, studies have reveals among others that all the afore-mentioned strategies, with the exception of N-POWER that is ongoing, have not been successful due to numerous challenges bedabbling their coordination and implementation.

Challenges of TVET in Nigeria prior to COVID-19 pandemic

TVET is an instrument, per excellence, for technological advancement of any nation when it is properly implemented. In Nigeria, TVE started long before the arrival of the European missionaries (National Board for Technical Education, 2011). Its development was slow until after independence in 1960. Its development has faced serious implementation challenges. Some of which include: poor funding; erratic power supply; Inadequate, obsolete and poorly equipped TVET workshops, libraries and classrooms for training of students; Unstable academic calendar; Staff shortages across board; Unattractive Conditions of Service for teachers; Weak Support Structure for Students' Industrial Work Experience Scheme (SIWES); Mismatch between acquired skills and market needs; Brain

Drain; High incidence of cultism; Examination malpractices and social vices; Negative public attitudes and perceptions regarding Technical Vocational Education and Training (This notion is rapidly changing due to the dwindling economy and the Government embargo on employment). These constitute the roots of the problems hindering the attainment of the goals of TVET in Nigeria.

Other challenges of TVET amidst Covid-19 pandemic

Here are some major challenges, TVET together with other Institutions of learning across the world, are facing due to the Covid-19 outbreak in those days:

1. *School*

Going to school is the best public policy tool available to raise skills. School time can be fun and can raise social skills and social awareness (Salsedo and Cherelus (2020). In Schools, Students work hand in hand with their teacher to succeed; they learn to participate and guide one another through class discussions. The primary point of being in school is that it increases child's ability.

It can't be estimated how much the Covid-19 interruption affect learning. With cases of the pandemic now skyrocketing in some countries, there is still talk of closing schools again (Nwosu-Igbo, 2021). Teachers in schools and Colleges will become underutilized. Since, they have to adjust their methods of teaching to have less interaction with their students through online classes to cover the curriculum. With this mode of teaching, direct teacher support to assists students is now limited. Without face to face interaction, teachers are unable to explain and expand on topics. Let's hope and pray that there will be no lockdown again.

2. *Shifting from Face-to-Face to Online Classes*

Prior to Covid-19 Pandemic, online learning was not popular amongst educators and students, and many didn't believe that it is possible to learn properly in a virtual class. But with the pandemic still raging, virtual classes have become commonplace and will remain so for a long time. In developed world, many teachers and students have been excited by the move to the online delivery mode Sahu (2019). Already lesson plans are been prepared and delivered by teachers through online to their students.

In Nigerian Schools and Colleges, the transition to online mode remain a bigger challenge. Many college teachers were not able to facilitate online teaching with immediate effect because, they do not have enough infrastructure and the necessary training to enable them use online learning platforms (Sahu, 2019). Equally, many college students do not have access to laptops and internet facilities at home. It is also, not possible to teach practicals and labs, music and art courses online (Alruwais, *et al.,* 2019). What then will happen to those students in science and technology whose courses cannot be taught online?

3. *Assessment of Students' Progress*

The closure of schools, colleges and universities not only interrupts teaching around the world. The closure also coincides with a key assessment period and many exams have been cancelled (Kearns, 2020). The transition from face-to-face teaching to online delivery has seriously impacted on assessments and evaluation of Students' progress. In addition, students who do not have an Internet facility suffer great disadvantage while participating in the evaluation process, which would adversely affect their grade point averages (GPAs) Raaheim, *et al.,* (2019). Applying assessments online on Technical and Vocational Education and other courses designed for face-to-face learning is another challenging task. Changing the assessment types to fit online mode is difficult. Who will monitor the assessment to ensure that students are not cheating during online tests? Typical example is the adoption of Computer Based Test (CBT) in the evaluation of Undergraduate students.

4. ***Practical and Laboratory Lessons***

In Technical colleges for instance, one of the cardinal objectives is producing graduates with relevant hands-on skills for self-employment. The subjects are carefully prepared to be practical in nature with their set goals and objectives that can only be achieved through practical and lab works involving interaction between teacher and students in the Workshops and Laboratories respectively. In these learning environments, students work hand in hand with their teacher to succeed, they also, learn to participate and guide one another (**Burgess** & **Sievertsen, 2020)**. As a result of the outbreak of the virus, field works are directly impacted. Lab tests, practical, and performance tests are not possible to be conducted online.

5. ***Field Trips***

In another dimension, Field trip is an educational procedure by which the trainers obtain first-hand information by observing places, objects, phenomena and processes in their natural setting. It also, involve a journey by a group of people to a place away from their normal environment. Activities that happen on the field trips often include: lectures, tours, worksheets, videos, and demonstrations. As a result of the Pandemic, Field trips are directly impacted, most of the places required for visitation are closed due to social distancing. Lim (2020) states that skills learning without practicals and trips is a practice which is generally seen as less favourable.

6. ***Travel Restrictions***

The Covid-19 outbreak has created worldwide chaos for airlines. Nations across the globe are closing international borders to mitigate the outbreak (Salcedo & Cherelus, 2020). It is obvious that many staff members in Technical colleges and Universities of Technology have already paid conference registration fees and air tickets intended to attend but, it was not possible due to travel restriction. Academic Institutions are advising their staff members to postpone travel, until there is a return to normalcy. The Institutions across the world also, requires international students not to travel overseas and continue their studies from hostels. Students traveling overseas are putting themselves at risk of getting infected. In this situation, not only Technical programmes are affected, but all Institutions of learning.

7. ***Quality of Graduates***

The College, Polytechnic and University graduates have experienced major teaching interruptions, major interruptions in their assessments, it has also caused a tremendous level of stress among the staff and students that effect learning and psychological health of students due to the global lockdown (Kandola, 2020). The lockdown of Institutions, for instance, not only affects internal assessments, it let to adjustment of school calendar and/or cancellation of complete session at the tertiary level for the entire cohorts (Andersen and Nielsen, 2019). By so doing, the quality of graduates of the system is greatly impacted. This phenomenon is clearly manifesting in the labour market.

Conclusion

Even though, with the availability of vaccinations Countries have returned to unrestricted movement; But, the shadow of the COVID-19 pandemic still looms. TVET Institutions should continue to observe the number of measures to avoid the spread of the virus. The greatest fear for the future of Nigerian children amid the pandemic, is the collapse of the educational system. It is quite obvious that education is the best legacy one can give to a child. But, the economic impact of the pandemic has driven some parents to pull their children out of school to learn a trade or to work as domestic help, and many of these children end up being molested (Nwosu-Igbo, 2021). Some girls and boys after being pulled

out of school end up as prostitutes, 'yahoo boys' and touts on the streets. This wasn't enough, then came the closure of inter-border movement as a result of which many people feed once a day. Depression and ill health began to set in. Some hospitals rejected sick people due to the fear of the spread of the corona virus. Most businesses folded up because its running capital was expended for food to survive. Despite the outbreak, teachers have kept their students' learning. They are therefore, "*the unsung heroes of the pandemic.*"

Recommendations

1. Management of Institutions should establish a task force that include members from different units to plan and deal with the Covid-19 crisis. The task force should frequently meet and make informed decisions as the situation warrant.
2. The health and safety of students and staff should be the top priority, at such Nigerian government should prioritize teachers to receive the Covid-19 vaccine, after frontline health workers.
3. Due to the rapid increase of Covid-19 cases worldwide, Institutions should avoid meetings involving large numbers of staff or students, instate they should try to conduct *Zoom meetings*.
4. Some courses, such as labs, fine arts, clerkship, art, and music, cannot be taught online. In such cases, the faculty can simply grade students on the work they have already done or suspend classes until things become normal.
5. The funding of TVET must be increase gradually and backed up by law to ensure prudent spending.
6. Functional workshops with modern equipment, tools and machineries and standard libraries should be provided to every vocational technical education institution in the country.
7. Vocational and Technical Education Institutions should be redesigned for competency-based training involving the use of ICTs and development of an e-learning compliant mobile applications to bridge the desired gap.
8. Management of TVET Institutions should provide proper Internet connectivity to ensure quality e-learning compliance for smooth transition to online classes and assessment of students' progress.
9. Government should do everything possible within its power to ensure steady power supply in all vocational and technical education Institutions in the country and/or provide appropriate standby generators for the operation of machines, tools and equipment involved in skills acquisition.
10. Government should accord Technical and Vocational education a separate legal recognition due its role in national development instead of being covered under the umbrella of science and technology.

Closing

Finally, I warmly thank all those that are present at this occasion and wish them all a fruitful discussion in the Technical Sessions (Physical/Virtual) and for those that have come from par away, I wish them journey mercies at the end of this conference.

THANK YOU FOR LISTENING

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FUNDING OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN THE ERA OF COVID-19 PANDEMIC

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BEING A LEAD PAPER DELIVERED AT AT THE OPENING CEREMONY OF THE 34TH ANNUAL NATIONAL CONFERENCE OF THE ASSOCIATION HELD AT FEDERAL COLLEGE OF EDUCATION (TECHNICAL), GOMBE, ON MONDAY 20TH OCTOBER, 2021

Abstract: *Technical vocational education and training (TVET) is understood as comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods. The paper described education is a capital-intensive social service, which requires adequate financial provision from all tiers of government for a successful implementation of educational programmes. Government's ultimate goal is to make education free at all levels in addition to assistance from international and local development partners, grants for research and other donor agencies. It further explains the policy regarding funding of TVET in Nigeria. The paper decried increasing costs of establishing and running TVET in the era of COVID-19 due to high cost of materials and equipment. Hence, it renewed a clarion call for all Nigerian Government to raise its annual budgetary allocation to education in line with the UNESCO recommended minimum of 26.*

Keywords*: Technical Vocational education and Training, Covid-19 Pandemic, Funding*

Introduction

> *"Since education in considered the KEY to effective development strategy, Technical Vocational Education and Training (TVET) must be the MASTER KEY that can alleviate poverty, promote peace conserve the environment, improve the quality of life for all and help achieve sustainable development"*

Technical Vocational education and training (TVET) is considered a powerful tool to prepare youth for the labour market and provide lifelong learning opportunities to adults. It plays a strategic role in the achievement of the 2030 agenda for sustainable development. In particular, Sustainable Development Goal (SDG) that aims at inclusive and quality education for all and promotes lifelong learning. It notably targets an equal access for all women and men to affordable and quality technical, vocational and tertiary education" and "a substantial increase in the number of youths and adults with relevant skills, including technical and vocational skills for employment, decent jobs and entrepreneurship.

TVET, as part of lifelong learning can take places at secondary, post – secondary and tertiary levels and includes work-based learning and continuing training and professional development which may lead to qualifications. TVET also includes a wide range of skills development opportunities attuned to national and local contexts. Learning to learn, the development of literacy and numeracy skills, transversal skills and citizenship skills are integral components of TVET (UNESCO, 2017)

Similarly, the National policy of Education (Federal Republic of Nigeria, 2014) defined TVET as a comprehensive Education referring to those aspects of the educational process involving, in addition to general education, the study of technologist and related sciences and the acquisition of practical, skills, attitudes understanding and knowledge relating to occupations in various sectors of economic and social life.

The Federal Republic of Nigeria (2014) states the goals of Technical Vocational Education and Training (TVET) as to:

(a) Provide trained manpower in the applied sciences, technology and business particularly at craft, advance craft and technical levels;

(b) Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and

(c) Give training and impact the necessary skills to individual for self- reliance economically.

The importance that government now attach to TVET is reflected in the various poverty reduction strategy that government have developed. One of the most important features of TVET is its orientation towards the world of work and the emphasis of the curriculum on the acquisition of employable skills. TVET delivery systems are therefore well placed to train the skilled and entrepreneurial workforce that the country needs to create wealth and emerge out of poverty. Another important characteristics of TVET is that it can be delivered at different levels of sophistication. This means that TVET institutions can respond to the different training needs of learners from different socio-economic and academic backgrounds, and prepare them for a gainful employment and sustainable livelihoods. The youth, the poor and the vulnerable of the society can therefore benefit from TVET.

However, the socio-economic environment and the contextual framework in which TVET delivery system currently operate in the country is characterised, by:

- Poor public perception;
- Low quality
- Huge numbers of poorly educated, unskilled and unemployed youth;
- Geographical, gender and economic inequalities;
- Uncoordinated, unregulated and fragmented delivery system;
- Weak monitoring and evaluation system;
- Shrinking or stagnant wage employment opportunities especially in the industrial sector;
- Weak national economy, high population growth and growing labour force; and
- Inadequate financing, poor management and ill-adopted organizational structures.

Beside all the above the global economic crisis as a result of COVID – 19 Pandemic, has had it's fair share on Nigeria, education and TVET in particular. For nearly two years, barely a day has passed that we have not heard dire economic news about Nigeria. Unemployment has been rising, company profits has fallen, high currency exchange rate, low level of productivity both in the oil and non-oil sector (Agriculture, solid minerals, manufacturing and services), a weak and concentrated energy base and a high inflation rate. Is there a single word to describe this development? Yes "**COVID–19 PANDEMIC".**

What is COVID–19?

At the end of December 2019, China informed the World Health Organization (WHO) of a form of Pneumonia with an unknown etiology that was detected in Wuhan city in the Hubei province of China (World Health Organization, 2019). By 3rd January 2020, 44 patients were reported by WHO. By 12th January 20202, detailed information from the National Health Commission of China associated the outbreak of the disease with the seafood market in Wuhan. This disease as identified as a novel strain of COVID – 19, by the 12th of January when China proceeded to share its genetic sequence for other countries to use in developing testing kits. On 13th January, the ministry of public health in Thailand reported the first imported case from Wuhan and by the 23rd January, Covid-19 had spread to Japan, Korea and the United States of America (World Health Organization, 2020).

Consequently, the National Centre for Disease Control (2021) reported the first case of Covid-19 occurred in Nigeria, when an Italian who works in Nigeria and returned from Milan, Italy to Lagos, Nigeria on the 29th of February, 2020. He was confirmed by the virology laboratory of the Lagos University Teaching Hospital, part of the laboratory network of Nigeria center for disease control. The patient was clinically stable, with no serous symptoms and was being managed at the Infectious Disease Hospital in Yaba, Lagos. This statement was made and confirmed by the federal ministry of Health on the 27th February, 2020

Covid-19, the Nigerian economy and education

Nigeria accounts for about half of West African's population with approximately 202 million people and one of the largest population of youth in the world with an abundance of natural resources, Nigeria is Africa's biggest oil exporter, and has the largest natural gas reserve on the continent. Nigeria is highly vulnerable to global economic disruption caused by Covid-19, particularly due to the pronounced decline in oil prices and spikes in risk aversion in global capital markets. Nationally, 40% of Nigerian (83 million people) lives below the poverty line while, another 25% (53 million people) are vulnerable (Edwards, 2021 in Moses, 2021).

With Covid-19, many of these 53 million vulnerable people could fall into poverty. The microeconomics situation is more challenging now than in 2015-2016, when oil prices fall sharply and Nigeria experienced its first recession in 25 years. In the current situation, Nigeria has fewer buffer and policy instruments to cushion the adverse effects. The excess crude account is depleted, external resources are highly reliant on short term flows, and policy uncertainty affects investors' confidence. Before the 2016 recession, Nigeria's economy was growing fast at 6.3% by contrast, before Covid-19 struck, the economy was 2.2%. Inflation was in single digits in 2014, compared to about 12% in 2019. The general government fiscal deficit was 4.4% GDP in 2019, compared to 1.8% in 2014 (World Bank, 2020).

The situation has largely affected education, prompting training provides to search for rapid and feasible solutions to deliver learning content. Schools and training centers were closed, few business that remained open and allow only essential staff to work at their facilities, certifying exams and assessment were postponed and where training centers remained opened, teachers and students must follow the WHO recommendation on infection prevention and control.

Even before, the advent of Covid-19, the human capital development has been weak due to under-investment. Nigeria was ranked 168% of 173 countries in the Human Development Index (World Bank, 2020). The country continues to face massive development challenges, including the need to reduce the dependency on oil and diversify the economy, address insufficient infrastructure, build strong and effective institutions, as well as address governance issues and public financial management system. These pre-existing structural challenges have left the Nigerian economy especially vulnerable to Covid-19 outbreak and its consequences.

Funding of education in Nigeria

The financing of education is a joint responsibility of the federal, states/FCT and Local Government and the private sector. In this connection, government welcomes and encourages the participation of local communities, individuals and organizations. The Federal Republic of Nigeria (2014) states that efforts towards the improvement in the funding of education at all levels shall include.

- Increased government investment in education in order to eliminate the deficiency in public investment between Nigeria and other sub-Sahara and developing countries. At least 26% (UNESCO minimum standard recommendation) of Federal, states and Local Government budgets should be dedicated to funding of education at all levels.
- Strengthening governance framework and the skills of administrator at all levels, in order to entrench and promote a culture of accountability, effectiveness and efficiency in the management of public investment in education.
- Establishment of a framework for intervention funds from sectorial bodies like UBEC fund, TETfund, Industrial Training Fund, National Science and Technology fund, Universal Service Provision fund (USPF) and the petroleum Technology Development fund that would promote initiatives such as Read to be Educated, Advanced and Development READ campaign etc.
- Strengthening and harnessing policy and capacity to draw in and effectively utilize resources from international and local development partners such as World Bank, USAID, UNICEF, UNDP, DFID, JICA, KOKA, Nigeria/ Sao Tome and Pricipe Joint Development Authority, NGO's etc.
- In demonstration of social responsibility, contractors, consultants and other source procedures are to contribute minimum of 1.5% of contract sum/fee to a special education cooperate social responsibility fund (SECSOF) to be established; and
- Encouragement of formal participation of ALUMNI bodies in funding of secondary and tertiary education in Nigeria.

Under international law, Nigeria have the obligation to use the maximum of her available resources to realize the right to education. Even when her resources are very limited, she is obliged to prioritize certain immediate obligations, such as the introduction of free primary education and to guarantee education for all without dissemination. She is also obliged to provide progressively pre secondary and higher education and continuously improve the quality of education. This means that she must take immediate and progressive steps to fully realize the right to education and must not take retrogressive measures.

Funding of TVET in Covid-19 pandemic

On funding of education (TVET inclusive) one makes bold to say that the federal government owe it a responsibility to co-ordinate things that would promote educational growth and development in the country. Education in Nigeria is often times viewed as an exclusive service of the government. It has always been the belief of the public that the funding of education in general (TVET inclusive is the sole responsibility of the three tiers of government. Those who believed that the funding of education will be too cumbersome for government alone, agitated that there must be a paradigm shift to imbibe new core values that would align with other global realities such as the Covid-19 pandemic and other technological changes.

Covid-19, have made technical and vocational education and training (TVET) institutions and community groups offering vocational training programmes to close in order to slow down the spread of the virus. Many businesses have closed, or if open are prioritizing survival ahead of workplace training. As a result, there is increase pressure on governments, educational institutions, workplaces and community to groups to adapt distance and online learning to ensure the continuity and upscalling of skills development while keeping the communities safe.

Despite the priority displayed by the government and international community to skills development, TVET remains largely under financed. First, because it is expensive compared to general education (given the high cost of materials, equipment, facilities), but

also considering the low share of public budget dedicated to TVET compared to other levels of training. Therefore, in order for TVET programmes to change and adapt to these and other development and contribute to the achievement of the global sustainable development, the financing of TVET programmes has become a topic of key importance.

There is no amount of money that is enough to fund TVET in Nigeria, neither is there no amount of money that is too much to fund TVET. There is a limit to any single source of funding TVET, a combination is required to make it sustainable. The problems in TVET are huge, therefore, the most effective way of funding TVET is cost sharing, cost sharing is very sustainable way of funding TVET programmes.

Subsequent, to the covid-19 pandemic and based on the expensive nature of TVET, I wish to recommend/present an approach to the funding net as wide as possible to include;

1. Governments: Federal, State and Local government, all the three tiers of government should allocate a respectable percentage of their budges to the TVET programmes. The funding should be allocated based on the number of trainees admitted into the TVET programmes.

2. Development partners/International organizations; these are organizations who provide external aids for skills development and training. This may be inform of equipment and manpower through bilateral and multilateral relationship. These partners/organizations include; ford foundation, African Development Bank, World Bank, UNESCO, USAID, British Council and UNICEF.

3. Nongovernmental Organizations (NGO's), individuals or groups should support the funding of TVET, through donations of structures, equipment, facilities and scholarship to TVET students.

4. Internally generated income: TVET institutions should create a productive unit in order to sell goods and services to the local market. This has a double fold advantage, the students have learnt hands on practical experience and TVET institution has generated revenue for running its programmes.

5. Community Donations: Local Communities can make cash and non-cash contributions in the form of land and through community funds raising activities.

6. Alumni: All old students are usually very proud of their alma-mater. This can be used to effectively assist in funding TVET programmes. It could be in form of cash and material, for the growth and development of TVET programmes.

7. Contract awards: TVET institutions should be allowed to carry out contracts by direct labour both within and outside the institutions. Small scale construction, renovation of buildings and facilities and electrical wiring can be comfortably carried out by TVET institutions to generate funds for effectively running of the programmes.

8. Employer Levy: Employers both public and private should contribute to a skills training levy based on a percentage of their organizations payrolls (less often on company profit tax, value product, foreign workers etc.). The percentage of the training levy should range from 1-3% of the payroll.

9. School/Trainee fees: let all trainees pay a certain amount, even if they are poor. This helps in identifying motivated students, which gives them self-esteem and it increases TVET sustainability. Amount generated as fees could be plug into funding TVET programmes.

Conclusion

The Covid-19 pandemic demonstrated the need to strengthen the preparedness and resilience of all TVET institutions. TVET providers can invest in several areas to ensure that they are prepared for future crisis that can threaten to disrupt teaching and learning.

Investment in smart technologies, such as development of content for online learning platforms, incorporation of virtual and augmented reality tools in training and e-portfolio skills accreditations tools can enhance the learning experience and make it more flexible during regular periods but also facilitate transition to crisis mode in case of future disruptions to face- to- face teaching. Ultimately, there is the need to modify funding policies to align with the strategic aims and encourage innovation through targeted competitive funding. Bearing in mind the principle of "NO STUDENT IS LEFT BEHIND" must be embraced and all learners be given a fair opportunity.

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SUB-THEME 1

POLICY AND LEGISLATURE IN TVET IN THE ERA OF COVID-19 PANDEMIC

TRANSFORMATIONAL LEADERSHIP IN TVET SECTOR: A PANACEA TO COVID-19 CHALLENGES IN NIGERIA

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Abstract: *This paper gave an overview of the long-term negative impact of COVID-19 pandemic on Technical Vocational Education and Training (TVET) sector and its consequent impact on national development. The paper presented issues of TVET before the pandemic, transformational leadership as a veritable tool to effectively manage the needed transformation in TVET education, delivery and challenges of TVET education during the pandemic. Suggestions made include among other, that seminars, conferences and training be organised to equip TVET education managers on the effective use of transformational leadership characteristics, and train lecturers on the use of technology in designing and delivering online live lectures.*

Keywords*: Transformational Leadership, TVET Sector, COVID-19 Pandemic*

Introduction

The COVID-19 virus has infected several people globally. Most countries of the world are shaken by the pandemic and for the first time in several decades, the world is witnessing a type of virus that does not discriminate based on age, gender or even race. The virus emanated from the Wuhan province of China and has since spread to every part of the world. The disease has been categorised as infectious and contagious by health experts. As a result, the World Health Organization adviced the practice good hygiene by washing their hands with soap and running water or with alcohol-based hand sanitisers while keeping their nose and mouth covered with a face mask (WHO, 2020). The COVID-19 pandemic has caused unprecedented measures to be taken by many countries such as social distancing, self-isolation, travel restrictions and restrictions on social gathering (De, Vos, 2020). Governments all over the world commenced mandating all non-essential persons to stay in their respective homes grinding halt in economic activities. This wish advice if heeded, has the potential to reduce the spread of the disease and save lives in the process. Unfortunately, developing countries such as Nigeria already face immense pressure with lack of updated technology for educational purpose, broken health care system with inadequate facilities to cater for the citizens, epileptic supply among others.

The educational sector generally is the wheel of development of nations, with its closure and consequent negative effect on students' learning and educational achievement, one cannot help but imagine the possible long-term effect, this might have on TVET education and it impact on national development. Obviously, the landscape of Technical Vocational Education and Training (TVET) must undergo some transformation to keep safe and still be full engaged in active and productive self-reliance education. The sudden outbreak of COVID-19 has led to scholars and education stakeholders to devise ways of moving instruction from physical campuses to online instruction. This sudden shift in content delivery will require a lot of resources to be designed, provision of infrastructure, equipment and manpower training to help students and instructors adjust to the new online study (Farahami, 2003; Salmon, 2001). Existing and experienced online facility would have to share materials and their experience with other faculty members not accustomed to online instructions. Consequently, the TVET sector will need leadership, solidarity and collaboration to defect the effect of the COVID-19 pandemic on students' learning and to make the new phase of TVET in Nigerian higher education to be effective and efficient. This paper therefore seeks to examine the challenge of COVID-19 on the management of TVET sector through transformational leadership. This was discussed under the following sub-heading; Issues of TVET before COVID-19, Impact of COVID-19 on the Management of TVET Education, Transformational leadership on effective management of TVET and consequences of COVID-19, challenges TVET education during pandemic, conclusion will be drawn and suggestions made.

Issues of TVET before COVID-19

Technical Vocational Education and Training (TVET) is one of a recognised and effective process by which quality, up-to-date information, literate and knowledgeable workers are prepared, trained or retrained worldwide. UNESCO and ILO (2002) defined TVET as a comprehensive term referring to those aspects of the study of technologies and related sciences, the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. In a nutshell, TVET prepares human resources for the ever changing world of work. The aim of TVET is to prepare people for (self) employment and to be a medium of evolution for people to the world of work; by making individual to have a sense of belonging in their communities; TVET thus equips people not only with vocational skills, but with a broad range of knowledge and attitudes that are now recognised as indispensable for meaningful participation in work environment (Uko, Ugboaja, Ibe & Obunnadike, 2016). Examples of the benefits include self-awareness, self-esteem, and strengthened interpersonal life, citizenship, communication and entrepreneurial skills. TVET refers to a range of learning experiences which are relevant to the world of work. Learning experiences may occur in a variety of learning contexts, including educational institutions and work places. In order to reflect on the integral nature of training in skills development, the term 'TVET' where the last 'T' stands for training has now become very popular among the international communities. Change requires transformational leadership style that motivates team members to work together to identify needed change and pursue it with a clear vision is presented as a veritable tool for managers of TVET education for the effective implementation of online education to combat the impact of COVID-19 on TVET education programme. According to the National Policy on Education, the overriding goals of TVET in Nigeria are to:

- Provide trained manpower in the applied sciences, technology and business, particularly at basic and advance technical levels;
- Provide technical knowledge and vocational skills necessary for agricultural, commercial and economic development, give training and impact necessary skills with a view of making the individual self-reliant economically.

TVET education is done at Senior Technical Colleges, Colleges of Education 'Technical', Universities, Polytechnics and Monotechnics. For education to enhance national development, it must be relevant and adaptable to the needs of the society. However, there is apparent disenchantment among students, parents, government and the populace about the quality and relevance of education in Nigeria. Dabalen & Oni (2016); Ojeje (2016) revealed in their study that TVET graduates are poorly trained on unproductive on the job and that graduate skills have steadily degenerated over the past two decades. There is therefore the need for greater accountability on the way TVET education is managed to deliver quality education to become more efficient and effective. The aims of higher education stipulated in the National Policy Education are to be achieved through teaching, research and development, knowledge generation and dissemination and international cooperation; dedicated services to the communities through extra-mural and consistency services (Federal Republic of Nigeria, 2014). These goals include:

- To contributes to national development through high-level relevant manpower
- To develop and inculcate proper values for the survival of the individual and society
- To develop the intellectual capacity of individuals to understand and appreciate their local and external environment
- To acquire both physical and intellectual skills which will enable individuals to be self-reliant and useful members of the society
- To promote and encourage scholarship and community services.
- To forge and cement national unity and to promote national international understanding and interaction (Federal Republic of Nigeria, 2014).

Impact of COVID-19 on the management of TVET education

The spread of the Coronavirus led to the temporary closure of all schools (primary to tertiary) in Nigeria by the Federal Ministry of Education on March 23, 2020 in a bid to contain its spread. However, school closures impact students, teachers, families as well as have grave economic and social consequences. These social and economic issues include student debt, digital learning, food, security, health care and internet among others (Karp & McGowan, 2020). In response to school closure UNESCO recommended the use of distance learning programmes and open educational applications and platforms that schools can use to reach learners remotely and hint disruption of education (UNESCO, 2020). This situation becomes worse when many trainees or students are forced out of job for temporary or full-term when many businesses closed due to being unable to buffer the cost. Keeping students out of school for a long time; this is probably because the Nigeria's educational sector especially TVET education lacks the needed technology to cater for her students. These is also the issue of teachers' lack of skills, capability and resources to deliver live lectures online. To hint the impact of COVID-19 on TVET education, education managers, educators, and policy makers must re-think the way higher education is delivered and accessed by students, and some scholars have come up with the most valuable and effective means of hunting the impact of COVID-19 on education, this is known as distance learning. Since one of the safe measures on prevention the spread of COVID-19 is social distancing.

Transformational Leadership of TVET and the consequences of COVID-19

As a result of increasing rate of pandemic in the country and the world over, the way forward for TVET education progress in Nigeria will require a new agenda of transformation from the old traditional transmissive classroom instruction in a physical classroom to online education that would incorporate occasional physical classroom interactions. It appears that the managers of higher education using the transformational leadership behaviours would be more effective in achieving the goals of TVET education. Though online courses have been going on in very skeletal level in some Universities, Polytechnics and Colleges of Education Technical, it must be on a full-blown scale because of the experience from COVID-19 pandemic, though in addition to the physical classroom interaction experience which should be designed on a minimal meeting schedule. This should be based on WHO protocols on COVID-19 preventive measures in the campuses. There is evidence (Farahami, 2003; Salmon, 2001) that online instruction was becoming increasingly popular among students. The enrolment growth projection for online courses has consistently increased. The Department of Education (2001) reported that the internet is changing the landscape of education in the United States and the world and calls upon "an e-learning agenda" as a centrepiece of the nation's federal education policy. This e-learning has become reasonable in Nigerian TVET institutions occasioned by the COVID-19 pandemic. This has thrown a challenge to schools and tertiary education administrators on how to manage e-learning to achieve the goals of TVET programmes in Nigerian institutions of learning.

Instructors will have to develop new skills to deepen course contents, learn the technology to create a course online community and distribute the information to students, creating a virtual class community and to bring all students and their ideas together. This digital transformation of TVET education in Nigeria will require managers (Provosts, Rectors, Vice-Chancellors) who will first of all understand the need for the new agenda and become transformational leaders, so that they can influence their staff, academic and non-academic including students to buy into online course delivery and learning. Online instructional delivery will require rethinking about many aspects of educational delivery to help students succeed. The frame of mind and certain behavioural patterns and norms already cultivated by instructors and students on physical classroom learning will have to be changed and new ones developed. It is assumed that with the commitment of federal government to provide the needed infrastructure and technological materials and equipment for online-learning in our institutions, other vital aspect of its effectiveness will be assessment activities which is the responsibility of the school or departments,

and supervisors by the management team. The basic elements that should be carried out and monitored closely by the institutions managers include:

(i) the educational materials to be taught by the instructors

(ii) the teaching and learning activities that should take place in the virtual classroom

(iii) the assessment activity to measure students' learning and

(iv) report of the score results given by instructors to the students.

These will be influenced by factors such as students' learning styles, the technical implications, the adaptive educative content, the learning and knowledge management, feedbacks and motivation (Salmon, 2001). The author has suggested five-step model that could improve quality of interaction in online education: access and motivation, online socialization, information exchange, knowledge construction and development.

1. ***Access and Motivation***: Students will have to be given information about the availability and access to the course website. The course syllabus could be posted to provide information about the course requirements, the assessments, grading criteria, time management skills, the instructor's contact information as well as some encouragement.
2. ***Online Socialization***: Social interaction is the initial step of creating an online learning community. This is important due to the importance of socialization and networking by participants to create inter-activity (Salmon, 2001). The social interaction will help students feel comfortable and free from the feeling of isolation, thereby fostering a welcoming learning community that cultivates live discussion.
3. ***Information Exchange***: This stage serves as an orientation to the course and provides the opportunity for information exchange that afford the instruction the ability to provide direction to the students in using information about the course. This also helps students to learn where to find relevant information to the course.
4. ***Knowledge Construction***: The interaction through written communication helps students to connect with course materials and the synergy of this interactions fosters deep learning. Interactivity is built into the course design to allow students freely discuss their issues and their points of view. The instructor serves as a guide and an equal partner (Collision et al, 2000).
5. ***Development:*** at this stage, the participants use the information provided to them and construct their own meaning based on their interpretation and past experience and knowledge. They employ critical thinking techniques to construct their own meaning of materials given to them to complete their assignments, projects or commenting on each other's writing.

Challenges of TVET education during the pandemic

1. ***Institutes' Readiness to the new Norm of Learning***: public and private TVET providers are suggested to conduct their training and theory courses online. The ability to TVET institutions to implement e-learning depends on the capacity to adapt curriculum as well as the preparedness of infrastructures such as internet connectivity, devices or media, learning platforms and the readiness of trainers and teachers for online learning (UNESCO-UNEVOC International Centre, 2020). TVET institutions should revise the management, T&L models and assessment for e-learning before implementation. Some academic subjects that do not require manual activities can switch to e-learning more easily. Such courses like administrative management, management systems and programme courses can be conducted online easily. For TVET curriculum it is a big challenge to migrate to distance and online learning because TVET focuses more on practical skills and work-readiness. Practical skills acquired through learning-by-doing, which occurs in school-based workshop or through hands-on experience at the workshop. Some practical exercises require the use of specific equipment or materials that make e-learning approaches a weak substitute to conventional methods (Hoftijzer et al, 2020). The highly practical nature of TVET makes e-learning a universal solution.

2. ***Instructors' Readiness to the New Norm Learning***: before the outbreak of the COVID-19, e-learning was not the preferred method used by the instructors in TVET institutions due to the programmes focusing more on practical components. According to the study from UNESCO – UNEEVOC International Centre, 2020), nearly a third of all respondents out of 126 countries, did not use e-learning at all, another third used e-learning occasionally, 17% use e-learning regularly and merely 11% used it very often. However, affected by the COVID-19 pandemic, TVET institutions need to shift from conventional teaching methods to online learning in response to the lockdown. This adhoc response dramatically changes the learning method used by instructors and they need to adapt to new teaching mediums. Some instructors may lack skill in e-learning usage and integrating ICTs in T & L. This is supported by Dumbiri & Nwadiani (2020) stating that some instructors are not familiar with e-learning facilities utilization skills and they require training in basic skills for e-learning. Instructors may also need to adapt in pedagogies approaches to the new norm in T & L processes. The readiness of instructors for e-learning needs time to prepare for teaching materials and to improve their skills as well as online pedagogy and evaluation skills. Moreover, some lecturers prefer conventional teaching methods over online teaching because the engagement between the students and lecturers are reduced due to the lack of ICT skills among lecturers and low collaboration between students during online learning (Thongaiah et al, 2020). The study from Thangaiah et al (2020) about the usage of e-learning among TVET students and instructors also stated that many students do not participate actively in online learning due to lack of time, insufficient infrastructural facilities, inability to access the internet and frequent changes in curriculum of vocational courses. Due to this factor, instructors refused ICT implementations and it is difficult to handle online classes during the COVID-19 pandemic.
3. ***Students' Readiness to the New Norm of Learning***: the world's school students which is roughly put at around 1.6 billion or 91.3% have been affected by system closures during the COVID-19 (UNESCO, 2020). In order to mitigate the losses learning, e-learning has been implemented in schools and TVET learning institutions to ensure a smooth process of T&L. there are several challenges related to e-learning faced by students including lack of necessary remote training skills, require more time in preparing videos or online learning, insufficient internet connectivity, expensive data packages, usability of learning platforms, student friendly content (UNESCO – UNEVOC International Centre, 2020). Moreover, the closure of businesses prevents students from carrying out practical training which is an important aspect of TVET due to its focus on practical skills and work-readiness. These students are facing serious disruptions from the lockdown because workshop based training and work-based learning either stopped or continue to be conducted in restricted numbers with strict sanitary measures (ILO, 2020). Thus, the extension of the school year happened due to the inability to conduct assessment in programmes. These circumstances may burden the TVET students financially because they might not be able to pay the tuition fees and extension of completion study might affect them to have certificate to apply for job.

Conclusion

COVID-19 has brought tremendous challenges which has changed the landscape of TVET education in Nigeria. Like most private institutions of learning, the management team of TVET education at various levels in collaboration with Federal Government must work together to provide the necessary infrastructure and equipment needed for effective online education. And to effectively manage change, the change agents – managers of TVET education must be transformed in their approach. Change is not easy to effect, that is why the transformational leadership style that motivates team members to work together to identify needed change and pursue it with a clear vision is presented as a veritable tool for managers of TVET education for the effective implementation of online education to combat the impact of COVID-19 on TVET education programme.

Suggestions

1. The Ministry of Education and Ministry of Science and Technology in Collaboration with management of polytechnics, universities and colleges of education technical should organise orientation programmes/conferences for the mangers of TVET education programme on the magnitude of the new online agenda for TVET education and what is required of them.
2. The Federal Government of Nigeria in collaboration with experts in transformational leadership should organise trainings and seminars on the dimensions and characteristics of transformational leadership for managers of TVET programme, so that it can be applied effectively in their management activities.
3. Schools and departments should be trained by experts in online education on the use of technology in online courses, designing and assessing online courses and developing reports that can be used to assess the progress of the programme, in order to make necessary adjustments where and when necessary.
4. Students should also be well informed on what is expected from them and properly guided to respond enthusiastically. They will be greatly encouraged if materials and equipment are available and adequate.

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UNDERSTANDING THE CONTEXT OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN NATIONAL DEVELOPMENT

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Abstract: *The purpose of this paper is to outline and discuss issues relevant to TVET at the beginning of the twenty-first century. TVET is most directly concerned with the acquisition of the knowledge and skills required for the world of work, formal and informal, urban and rural. This paper contains a discussion and examples of emerging developmental trends and challenges, skills needed to provide quality services in differing cultural and social contexts, provides the background necessary to understand the complexities of the issues addressed in the remainder art of the paper. A whole new group of career development staff, known as tutors, are now helping each student to be self-reliant. The outcomes of processes such as these will help ensure that informed decisions are made regarding appropriate educational and training programmes for each individual, thereby meeting the needs of all learners and helping to reduce the chronic problem of high dropout rates. Given the need for all types of education and training opportunities now and in the future, it may be more useful to replace the traditional hierarchical structures with one that might be seen as consisting, instead of circles of education and training. This new structure would value each type of education and training for its contribution to the educational and vocational fulfillment of individuals. This paradigm would also need to allow movement across and within circles, and the process of movement would need to be clear and transparent.*

Keywords: *National Development, Skills Acquisition, Technical Vocational Education And Training*

Introduction

Technical Vocational Education and Training (TVET) has brought rapid change virtually in all dimensions of life. It is an integral component of lifelong learning which plays a crucial role in helping individuals and countries to achieve a culture of peace, environmentally-sound sustainable development, social cohesion and international citizenship (UNESCO, 1999). Globalization of the labour market means that workers have greater mobility across borders, yet opportunities are not uniform from one country to another or in different segments of society within a given country. The outcomes of processes such as these will help ensure that informed decisions are made regarding appropriate educational and training programmes for each individual, thereby meeting the needs of all learners and helping to reduce the chronic problem of high dropout rates (Thiel, 2015). However, there is a widening gap between the rich and the poor, those who can seize opportunities and those who are marginalized, and those who have received an education and those who have not. The days of job stability are over for many, and are being replaced by a context where flexibility and transferability of skills are essential (Avis, 2017; Jackson, 2019). In many countries, prestige and status continue to be attached to university education, and young people seek career paths in the so-called professional occupations with the few employment opportunities in the profession for which they wish to train. However, TVET is often regarded as inferior, or as a second choice after education, regardless of the student's interests or abilities. Many people therefore dismiss promising and meaningful career paths in areas where employment demand is greater, simply because of the stigma attached to technical and vocational occupations. Education systems continue to be directed primarily towards preparation for university education, even though the majority of students move directly into the labour force (Heinz, Kelle, Witzel & Zinn, 2018; Morris, 2016). In Nigeria, there is a clash between the new world priorities and the traditional cultures. People are seen washing in rivers in front of houses with satellite dishes. Some countries import workers to fill blue-collar jobs while their own young people seek training in professions in which there are few or no openings. The investment in training often goes unrealized, as young people drop out of training, or having completed it do not enter the occupational field for which they have been trained. This paradigm very useful in that it attaches value to all occupational roles and recognizes the contribution they make to society at large.

Informed transitions

There are numerous examples suggesting that countries that are developing or redeveloping their industrial and technological capacities need to think carefully before adopting the policies of well-intentioned neighbours. For example, an intergovernmental aid project in Nigeria brought rice farming into small towns where there was no swamp water for irrigation. In a similar paradox, an example was recently cited of women working together in a local craft guild, watching wide-eyed as an ox cart loaded with computers drew up. The computers were to help them to be better entrepreneurs! Programmes need to be developed that focus clearly on locally and regionally evolving economic, social and cultural needs. A rush to adopt alternative systems often means that local needs, values and ways of doing business are relegated to second place and that informal learning and informal economies that produce transferable skill sets are overlooked. In addition to avoiding training programmes that may not meet the needs of a region or country, areas that are in the process of creating a training infrastructure may want to consider alternative ways of conceptualising it. One problem in many areas of the world where TVET has been established is the relatively low status ascribed to it within the context of the broader educational community (King, 2013). This lead young people and their parents to question the legitimacy of the education and training offered.

Before proceeding, it is important to outline the way in which some key terms are used in this monograph. In many cases, there are no universally accepted definitions. It is thus important for us to define key terms so that readers know the meanings attached to them.

1. ***Technical and Vocational Education and Training (TVET):*** In 1999, at the Second International Congress on Technical and Vocational Education in Seoul and at the 30th session of the General Conference of UNESCO in Paris, it was agreed to adopt the phrase "Technical Vocational Education and Training" (TVET) to describe the combined process of education and training and recognize the common objective of employment as their immediate goal. The congress emphasized that TVET should be a multi-domain concern, requiring collaborative and integrated approaches. TVET programmes should be designed as comprehensive and inclusive systems, accommodating the needs of all learners and accessible to all. Special efforts were needed to reach marginalized groups and programmes should be designed to facilitate entry into the mainstream. TVET programmes needed to be gender-balanced, attracting men into previously female-dominated occupations and attracting women into previously male-dominated occupations.
2. ***Career Development:*** Career development is the lifelong process of managing learning, work and transitions in order to move towards a personally determined and evolving preferred future. Career development programmes and services support are designed to support and assist people in managing these transitions (Blocher, 2017).
3. ***Career Information, Guidance and Counseling Services:*** They are services intended to help individuals, of any age and at any point in their lives, to make educational, training and occupational choices and to manage their careers. They include a wide range of activities, for example activities in schools to help students clarify career goals and understand the world of work; personal or group-based assistance with decisions concerning initial courses of study, courses of vocational training, further education and training, initial job choice, job change, or work force re-entry. It includes services provided to those who have not yet entered the labour force, services to job-seekers, and services to those who are in employment. Career information, guidance and counseling services often overlap with other forms of personal services, such as job placement, personal counseling, community-based personal mentoring, welfare advice and educational psychology. Frequently, these other services are delivered by people who also deliver career information, guidance and counseling, but there are often separate guidance services that do not provide career information, guidance or counseling (CES, 2011). Perhaps it is time to examine the effectiveness and utility of separated services as compared to a more integrated approach:

(a) *Career Guidance:* Career guidance refers to assistance given to individuals, or groups of individuals, in addressing problems related to occupational and life choices, offering full opportunities for personal development and work satisfaction. Career guidance is a continuous process, the fundamental principles of which is the same irrespective of the age of the individuals involved, and with due regard for the characteristics of those individuals and their opportunities (Lumby, 2012).

(b) *Career Counseling:* Career counseling helps individuals to achieve greater self-awareness, develop a life/work direction, increase their understanding of learning and work opportunities and become more self-directed in managing learning, work and transitions. Career counseling facilitates the acquisition of skills, interests, beliefs, values, work habits and personal qualities enabling each participant to create a satisfying life in constantly changing cultural, social and work environments.

Career information in TVET

Although advice, guidance and counseling each have the ability to help an individual through interaction with a person possessing a specific body of knowledge, they differ in focus and scope. Advice is focused primarily on the problem at hand and is typically generated from a perspective external to the individual. Advice is the prescription of a particular course of action regarding the presenting problem (Cormier, 2011). Guidance is much broader in scope, as the information provided focuses on relevant knowledge or options pertaining to the person's concerns or goals. It is, however, the individual who decides on her/his own course of action (Cormier, 2011). Finally, counseling creates a climate where individuals can explore, examine and clarify their own thoughts, feelings and actions to arrive at the answers that are best for them (Corey, 2016; Hoexter, 2019). Counseling promotes an exploration of self, to identify the course of action that best suits the person, and their own values or goals, thereby helping the individual to live in a more personally fulfilling manner (Hoexter, 2019). TVET which represents a comprehensive and inclusive approach is intended to help people achieve their full educational and vocational potential and in so doing make meaningful contributions to the communities in which they live. In considering the implementation, maintenance or expansion of technical and vocational education opportunities, it is important to consider some fundamental issues and challenges. The key issues here to address are the two prevailing orientations in TVET; human resource-driven approach and a market-driven approach (Morris, 2016). Given the potential advantages and drawbacks of each, how can a balance be achieved between the two within a given country or region? For example, some TVET is geared towards training individuals in skills relevant for a specific job in a particular factory. These skills may not be readily generalize to jobs in other factories or other occupations. In addressing these questions it is important to consider that learning arising from the formal and informal economy, as well as from paid and unpaid work. TVET programmes need to be designed to be flexible enough to anticipate and accommodate the impact of ongoing global changes on community and regional labour market needs and demands.

TVET and national development

Development refers to the ability of any nation to improve the lives of its citizens. This is usually based on the degree and the extent of socio cultural, socio economic, political and industrial development that are brought to bear through the enterprises of science and technology. Measures of improvement may be materials, such as an increase in the gross domestic product, or social, such as literacy rates and availability of health care (Offiong, Usoro & Akpanodong, 2016). Sustainable development as explained by Akpan (2015) refers to the development that meets the needs of the present which without compromising the ability of future to meet their own needs. Akeem (2017) asserted that sustainable development means solving the needs of today in such a way that society and environment are not harmed. The environment cannot be protected in a way that leaves half of humanity in poverty. There can be no long-term development on a depleted planet. Appropriate sustainable strategies must be developed for both rich and poor nations.

TVET is a major factor in ensuring that there is sustainable development in a developing country like Nigeria. However, efforts to define exactly what sustainable development is must reflect the varying conditions in different parts of the world and their impact upon national and cultural priorities and values. For example, "to an individual living in rural poverty in the developing world, "sustainable development", if it is to make any sense, must mean increased consumption and a higher living standard. By contrast, to an individual in a wealthy country, with a closet full of clothes, a pantry full of food and a garage full of cars, "sustainable development" could mean more modest and carefully considered consumption (UNESCO, 2006). Osagie (2015) stated that sustainable development leads to fulfillment of societal ideals considered relevant to the needs and aspirations of the society. Factors, which influence such developments, are based on human ability to explore, invent, and utilize. Satisfaction of spiritual, physical and material needs and the mastery of the environment are parameters of development when applied to the human society. The development of any nation depends very much on the advancement and application of science and technology (Uwah, 2013). Cultural differences do not just affect services provided to youth, but need to be taken into consideration for all age groups.

Impediments of skills acquisition in formal TVET

Uwah (2013) summarised concerns raised about the effectiveness of TVET in Nigeria as:

(a) Poor quality in the delivery of TVET programmes;

(b) High cost of training;

(c) Training not suited to socio-economic conditions;

(d) Disregard of the needs of the informal sector; and

(e) Disregard of the labour mark and high unemployment rate among graduates.

In an attempt to address these challenges, Harrison (2010) argued that TVET institutions need to restructure their programmes to be responsive to the needs of the job market, especially the industry. To achieve this goal, TVRT curricula must focus on outcomes in terms of the skills, knowledge and attitudes required in the industry. That is, TVET provision should be responsive to the demands of the industry. According to Ayomike (2013) argued that with TVET being more diverse because of the changes in the labour market, it should be able to integrate the youth into the working world. Given the prevailing economic trend, UNESCO (2006) identified the two major objectives of TVET as the urgent need to train the workforce for self-employment and the necessity to raise the productivity of the informal sector. They point out that lack of resources have led to cuts in the volume of training provide in public institutions. These cuts are a hindrance to pursuing the critical objectives of providing training and raising production. Considering the expensive nature of TVET as a form of education, it is imperative that an expanded system with necessary and adequate facilities and equipment will lead to the effectiveness of the system. Related studies carried out by Mia (2017), revealed that both formal and non-formal TVET lacked an effective linkage between training and the world of work. It further noted that because of its lack of coherent mode, practical skills training which does not produce the requisite skills for the job market. Additionally, the trainees also lacked training experience, initiative and motivation to discharge their duties effectively.

Indeed, there are several documented evidences of numerous other challenges against the attainment of quality skills in TVET programmes in Nigeria. For instance, in a study to find out the quality of TVET facilities in vocational and technical collages in Nigeria, Akhuemonkhan & Raimi (2014) reported that majority of the respondents rated as fairly adequate the quality of TVET facilities like workshop rooms, books, learning environment, machines, computer rooms, TV/Audio visual, instructors and contents of curriculum. On the status of quality assurance exercises in technical and vocational education in Nigeria, Akhuemonkhan & Raimi (2014) further reported that quality assurance is only appreciated in some areas in the collages but there are several areas that require improvement to make it more impactful.

Moreover, Ayomike (2013) identified the following as students' factors that act as challenges against attaining quality TVET programmes in technical and vocational colleges in Nigeria: poor interest to learn, poor entry qualification for TVET programmes, poor reading culture, lack of required learning material such as textbooks, poor parental background, peer group influence, lack of self confidence, examination malpractice and irregular attendance. Ayomike also identified the following as school factors that act as challenges against the attainment of quality TVET programmes in technical and vocational colleges: poor teaching methods employed by teachers, teachers lacked interest to teach, poor research attitude of teachers, poor preparation of lesson by teachers, poor use of teaching aids by teachers, poor students' teacher relationship, poor evaluation of students' academic performance, inadequate classroom blocks, lack of conducive staff offices, inadequate electricity supply, lack of water supply, inadequate workshop spaces, lack of TVET machines and tools, lack of TVET textbooks, lack of consumable materials and inadequate instructional materials. Obviously, the effect of all these challenges is that training of the students becomes grossly impeded and they may end up not acquiring adequate skills needed for getting and sustaining employment in the 21st century.

Conclusion

Conclusively, despite the advantages of imparting job-related skills and the high level of unemployment amongst those with general education, the recognition and preference for general education by the youth in the Sub-Saharan Africa is high. The reason for this is that personnel in administrative and leadership roles are generally chosen from people with a general education background. In this regard, many people consider general education as a suitable type of education that is capable of responding to economic and labour force changes in society. On the other hand, technical and vocational education has the advantage of imparting specific job-relevant skills which make the worker more readily suitable for a given job and more productive. Hence, both are important. It is in this light that most educational systems in Africa try to combine both general and vocational streams of education in varying proportions to suit their educational goals and aspirations. Therefore, talking about the importance of TVET, without any deliberate action to follow up the rhetoric, will not change its poor image and low status.

Recommendations

1. Proprietors of TVET institutions and school management committees should improve on supervision of vocational technical education programmes.
2. Proprietors of TVET institutions should ensure the provision of adequately functional instructional materials and facilities.
3. Proprietors of TVET institutions, donot agencies and individual philantrphies should contribute to attain adequate funding of vocational technical education programmes.

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DIGITAL SKILLS REQUIREMENT FOR SAFE AND EFFICIENT CONTENT DELIVERY OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN PUBLIC UNIVERSITIES IN RIVERS STATE DURING COVID-19 PANDEMIC

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***Abstract**: The study focused on digital skills requirement for delivery of Technical Vocational Education and Training in a pandemic in Universities in Rivers State. The study sought for the following skills: Information and communication skills, Specialized use of ICT-mediated learning skills, ICTs programme support skills and ICT literacy skills. The study had four purposes, research questions and hypotheses that guided the study. The study adopted descriptive design. The study was carried out in Rivers State Nigeria. The population of the study consisted of 300 respondents comprising 60 Lecturers and 240 Doctorial students in the two universities in Rivers State. The study adopted a structured questionnaire titled "Digital Skills for Delivery of Technical Vocational Education and Training Skills Questionnaire (DSDTVETSQ)". The instrument was structured on five-point rating scale of strongly agreed, agreed, moderately agreed, disagreed and strongly disagreed. A corresponding numerical value of 5, 4, 3, 2 and 1 was assigned to the response options for each item as represented below with real limits. The instrument was subjected to face and content validity by three experts has 0.82 reliability coefficient. Data collected from the respondents were analyzed using mean and standard deviation. The mean scores were used to answer the research questions and t-test statistics was used to test the null hypotheses at 0.05 level of significance. The computation of the mean, standard deviation and t-test was carried out with statistical package for social sciences version 20 (SPSS). Findings of the study revealed that information and communication skills are required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State. Findings of the study showed that specialized use of ICT-mediated learning skills are required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State. Hence, it was recommended, among others, that TVET lecturers be encouraged by concerned authorities to use the skills and other available pedagogical technologies during instruction of practical before field experience as this will reduce much emphasizes on theories rather than practical as most TVET course are vocational and practically oriented in nature.*

***Keywords:** Digital Skills, Technical Vocational Education and Training, COVID-19 Pandemic*

Introduction

Education is a process of training designed to give knowledge, develop skills and abilities that could lead to the development of mental alertness and the right attitude to life. This implies that if education is adequately inculcated, individuals would meaningfully help themselves and positively contribute to the growth and welfare of their immediate community. In essence, education remains the single factor that guarantees both individual growth and community development. Thus, if an individual acquires skills and the right attitude, and realistically apply the skills and right attitude for the benefit of his society, it means that education has helped to change (transform) the individual for better and pragmatically too. TVET refers to education and training given to the learners to acquire skills, knowledge and attitude needed in the world of work and necessary for employment in an occupation. TVET as defined by UNESCO (2010) and adopted by the Federal Republic of Nigeria (2013) is a comprehensive term referring to those aspect of the educational process involving in addition to general education, the study of technologies and related science and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic and social life. TVET is the sub-sector in the education system widely recognized as the power house for economic, industrial and technological advancement in Nigeria. TVET plays a vital role in human resources development enhancing industrial productivity and improving the quality of life (Hennig & Yasbley 2013). Institutions that deliver TVET programme are called TVET institutions. TVET institutions are established with the responsibility of providing TVET training and certification of the learners.

Universities, polytechnics, technical colleges of education, monotechnics and technical colleges are well known TVET institutions in Nigeria. Through these TVET institutions the learners are equipped with the right skills, knowledge, understanding and attitude needed in the world of work by TVET teachers. TVET teachers do not only need to be experts in their subject with a sound understanding of its pedagogy; they also need to have practical and up-to-date vocational expertise relevant to the workplace (Manisha, 2014). Therefore TVET is a powerful tool for national development only when TVET teachers are equipped with not just skills in manipulating tools and machines, demonstrating concepts, directing students learning but also digital skills to meet the fast changing technological world of work. Digital skills, according to Government of India (2012), are the perspective of the new educational training, with a clear objective of educating and preparing students, allowing them to appropriate themselves of new ICT knowledge, tools that serve to include them within the educational system. The incorporation of new technological structures facilitates the incorporation of new approaches to teaching and evaluating students with ICT, for observing the progress they have made; that is, these competencies develop planning and organizational skills in education, which aids the construction of new knowledge, using technologies as tools in new scenarios (Sana & Adhikary, 2017). The digital skills of the 21st century drive the competitiveness and innovation capacity of organizations (Sarkar, 2012). Although these skills are considered crucial, the digital aspect integrated with the skills of the 21st century is still not sufficiently defined (Sharma, 2015). The definition of digital skills may vary according to the objective, audience, and context (Sipilä, 2011). Digital competence refers to the diverse range of knowledge, skills and attitudes required in a digital environment (Abdulkarim, 2014). On the other hand, Anioke (2014) asserted that digital skills revolve around the ability to search for information, the ability to express oneself in different programming languages and the capacity for social interaction, integrating new technologies.

Digital skill is the basic understanding of how to interact with a computer, how to interact with applications on that computer, how to make it do what you want in real time. Digital skill can be seen as the ability to locate, organize, understand, evaluate, and create information using digital technology. According to Burning Glass Research (2014) digital learning encompasses many different facets, tools and applications to support and empower teachers and students, including online courses, blended or hybrid learning, or digital content and resources. Digital literacy is the ability to understand and use digital technologies effectively for everyday tasks. In education, TVET in particular it extends to all aspects of teaching and learning, and the usage extends into citizenship, industrial and e-safety. The increased use of ICTs in TVET has resulted in a major paradigm shift, from a total dependence on the objectivist paradigm to a growing adherence to the cognitive and constructivist paradigms. For example, the use of ICTs in distance education has resulted in a pedagogy, which is constructivist, collaborative and interactive (Chukwuemeka & Anaele, 2015). ICTs are revolutionizing education by removing distance from education and making knowledge more accessible to all (Department of Business Innovation and Skills, 2016). Technology-enhanced learning plays 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 (Educational Technology and Mobile Learning 2015). It is not surprising therefore to see a growing interest in ICTs across the world. ICTs 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. ICTs can enhance teaching and learning; it has the potential to become cost-effective as it offers greater flexibility regarding time and location of training delivery using ICT-mediated learning skills (The Guardian, 2015). Additionally, ICT-mediated instruction according to Ishiyaku (2012) refers to instruction via a technological channel such as television, radio or a computer. As quoted by Mckinsey and Company (2011) ICT-mediated instruction creates learning as "the ability to retain, synthesize, and apply conceptually complex information in meaningful ways that are basically student-centred.

ICT-mediated learning is guided by Activity-based, Reflection and Socially Oriented Learning Theories. Activity-based Theory places emphasis actively exploring the environment. According to Mossberger, Tolbert and McNeal (2011) ICT-mediated learning encourages learning by doing. It enhances the learning environment and requires students to develop critical thinking, research and evaluation skills. As emphasised by Nwanmadu and Chilaka (2015) the designed activities should resolve any contradictions and discrepancies in existing knowledge. Reflection Oriented Learning Theories facilitates self-reflection where one can resolve internal conflicts, problem solve and evaluate experiences as they make generalizations and formulate concepts which they apply to new situations. As stated by Usoro and Caleb (2014) ICT-mediated learning facilitates this by creating representations of mental interpretations. Jantrakool (2010) points out that self-regulated learning affords realism, reflection and problem solving, interactivity and discourse as it supports ICT-mediated learning. According to Jimoyannis (2010) research has proven that ICT-mediated learning can be used to teach problem-based learning. This can be done by making use of real-world data, through the use of visualisations, simulations, interactive and virtual environments. It is noted by Muniandy and Lateh (2010) that a problem can be segmented and enables the learners to visually observe the operation through ICT- mediated learning. Studies have shown that an appropriate use of ICT can raise educational quality and connect learning to real-life situations (Saud, 2010). ICT-mediated Teaching and Learning in higher education is efficient in developing course material; delivering content and sharing content; communication between learners, teachers and the outside world; creation and delivery of presentation and lectures; academic research; etc. Additionally, ICT tools enable students' learning by doing, developing independence, developing higher order skills and improving students' performance.

Learning theories such as the constructivist theory emphasizes that a student-center approach through construction of knowledge in a social setting is allowed through ICT tools (Tas, 2010). Hence, ICT-mediated learning, the environment is so designed that learners can locate, share and interact with others to gain knowledge in a specific area of interest through ICT literacy skills. ICT literacy skill is the ability to use digital technology, communication tools, and/or networks. to define access, manage, integrate, evaluate, create, and communicate information ethically and. legally in order to function in a knowledge society especially in the era of pandemic. COVID-19 outbreak has created educational disruptions, and global health concerns that proved very difficult to manage by global health systems (Coronavirus, 2020). The number of Coronavirus deaths was soaring with no immediate solutions in sight. The disease showed no sign of slowing down across the globe. The COVID-19 outbreak triggered the President of the United States, President Trump to invoke the "Defense Production Act" (COVID-19 Educational Disruption and Response 2020). The outbreak of Coronavirus negatively affected educational activities worldwide. The Coronavirus pandemic affected educational systems worldwide, leading to the widespread closures of schools (Duffy, & Ryan, 2020). It created serious disruptions in academic activities, as well as in career plans. As part of the global efforts to combat COVID-19, many countries across the world closed down schools in an attempt to contain the coronavirus pandemic (File: SARS-CoV-2 2020). Though, the Coronavirus pandemic is novel, but it already has noxious effects on humanity. School closures carry high social, educational and economic costs, and the disruptions they cause touch people across communities, but their impact is particularly severe for disadvantaged persons and their families. The disruption caused by COVID-19 in the educational sector may last longer than expected if a more reliable solution for Coronavirus is not found on time, and the spread of the disease continues. Sen and Antara (2018), states that school closing is very controversial, and it can have spillover effects on a large number of students in receiving schools. It can affect the quality of teaching and academic achievement, particularly for students with special needs or those with learning difficulties that often requires more physical attention and guidance from the teachers. Though, technology can be used to remedy some of the fallouts from school closures, but it cannot replace the important effect of face-to-face interactions by students and teachers. Besides, many students do not have the necessary access to supportive technologies which makes it harder to maximize the potentials of learning technology during school closures. This gave rise to acquisition of digital skills.

Statement of the problem

The 2020 academic cycle, in its various levels, as well as the educational systems in the world, suffered an untimely irruption with respect to the face-to-face modality. No doubts, unplanned school closures can cause severe problems for students, educators, parents and the society at large. Over 100 countries implemented nationwide closures, impacting over half of the world's student population (UNESCO, 2020). It could negatively affect the academic interest and performance of students. If the students are not engaged productively, it could lead to idleness which might result in youth involvement in crimes, loss of interest in learning, and poor academic performance. The adoption and integration of ICTs into the teaching and learning environment offers more opportunities for teachers and students to work better in a globalized digital age. However, this can only be achieved when TVET teachers move with the current trends in technological advancement which is reflected in the changing patterns of TVET curriculum. Policymakers, researchers, educators and organizations alike are beginning to recognize that closing this digital skill gap is essential to preparing the nations' educational sector especially TVET for a successful future. This is in line with Mckinsey and Company (2011) that the rapid pace of technological change makes fixing it more urgent than ever. Hence, it's now clear that equipping TVET teachers with the right digital skills especially in classroom instructional delivery and assessment of classroom instruction are critical in meeting the demand of Universities in Rivers State Nigeria.

Purpose of the study

The general purpose of the study is to determine the digital skills requirement for delivery of technical vocational education and training in COVID-19 Pandemic in Universities in Rivers State. Specifically, the study sought:

1. Information and communication skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.
2. Specialized use of ICT-mediated learning skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.
3. ICT literacy skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

Research questions

1. What are the information and communication skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State?
2. What are the specialized use of ICT-mediated learning skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State?
3. What are the ICT literacy skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State?

Hypotheses

H_{O1}: There is no significant difference between the mean responses of lecturers and postgraduate students on information and communication skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

H_{O2}: There is no significant difference between the mean responses of lecturers and postgraduate students on specialized use of ICT-mediated learning skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

H_{O3}: There is no significant difference between the mean responses of lecturers and postgraduate students on ICT literacy skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

Methodology

The research design adopted for this study was descriptive design. The study was carried out in Rivers State Nigeria. The population of the study consisted of 300 respondents comprising 60 Lecturers and 240 Doctorial students in the two universities in Rivers State. The study was a census as the entire population was studied. The instrument for data collection was a structured questionnaire titled "Digital Skills for Delivery of Technical Vocational Education and Training Skills Questionnaire (DSDTVETSQ)". The instrument was structured on 5 points Likert rating scale of Strongly Agreed, Agreed, Moderately Agreed, Disagreed, and Strongly Disagreed with corresponding numerical values of 5, 4, 3, 2 and 1 repectively. The instrument was subjected to face and content validity by three experts in the department of Vocational and Technology Education, Rivers State University, Rivers State. The instrument has 0.82 reliability coefficient. The mean scores were used to answer the research questions 1 to 4. A decision rule based on real limit of numbers was used with a cutoff point of 3.50. While t-test statistics was used to test the null hypotheses at 0.05 level of significance. The decision for hypothesis was that if the calculated value of t (tcal) is less than the critical value of t (tcrit), the null hypothesis is accepted. Otherwise, it is rejected. The computation of the mean, standard deviation and t-test was carried out with Statistical Package for Social Sciences version 20 (SPSS).

Results

Table 1: Mean and Standard Deviation of the Respondents' Responses on the ICT Skills Required for Safe and Efficient Content Delivery of TVET

S/N	Items	TVET Lecturers			PG Students		
		$\bar{X}_L$	SD_L	RMK	$\bar{X}_S$	SD_S	RMK
1.	ICTs for Teaching and Learning in TVET	3.57	0.692	SA	3.81	1.039	A
2.	Use Technology as curriculum	3.56	0.732	SA	4.11	0.859	A
3.	Use Technology as delivery mechanism	4.31	0.798	A	4.16	0.924	A
4.	Use Technology as a complement to instruction	4.28	0.750	A	4.35	0.719	A
5.	Use Technology as an instructional tool	4.93	1.004	A	3.95	0.932	A
6.	Use Internet/Web-Based Training	4.16	0.941	A	4.42	0.844	A
7.	Use Wireline technologies	4.95	0.875	A	4.09	0.860	A
8.	Use Audio/ Video conferencing	4.25	0.931	A	4.32	0.736	A
9.	Use Audiographics	4.99	1.088	A	4.31	0.790	A
10.	Use Interactive Television	4.05	0.990	A	4.42	0.625	A
	Grand Mean	**4.31**	**0.880**	**A**	**4.19**	**0.830**	**A**

Where: $\bar{X}_L$ = Mean of TVET Lecturers; SD_L = Standard Deviation of TVET Lecturers; $\bar{X}_S$ = Mean of PG Students; SD_S = Standard Deviation of PG Students; SA = Strongly Agreed; A = Agreed

Data in Table 1 revealed that TVET Lecturers had a mean range of 3.56-4.99 and standard deviation range of 0.69- 1.08. While the PG Students had a mean range of 3.81-4.42and standard deviation range of 0.71-1.04. The closeness of the standard deviation shows that the respondents are close in their responses. The mean showed that the respondents agreed that information and communication skills are required for delivery of technical vocational education and training in a pandemic era in Universities in Rivers State.

Table 2: Mean and Standard Deviation of the Respondents' Responses on the Specialized Use of ICT-Mediated Learning Skills Required Required for Safe and Efficient Content Delivery of TVET

S/N	Items	TVET Lecturers			PG Students		
		$\bar{X}_L$	SD_L	RMK	$\bar{X}_S$	SD_S	RMK
1.	Attitudinal and practical skills using ICTs	4.23	0.834	A	4.07	0.838	A
2.	Teach Practical Skills Using ICTs	4.40	0.821	A	4.09	0.808	A
3.	Use ICTs for Workplace Training	4.09	0.722	A	4.04	0.947	A
4.	Use ICTs for study-at-home instruction	4.18	0.658	A	4.19	0.766	A
5.	Use ICTs for Informal Skills Development	4.05	0.924	A	4.12	0.982	A
6.	Use ICTs for Prior Learning Assessment and Recognition	4.19	0.953	A	4.39	0.774	A
7.	Use ICTs for Virtual Internship	3.99	0.881	A	4.19	0.860	A
8.	Use ICTs to teach machineshop practice	3.95	0.990	A	4.26	0.856	A
9.	Use ICTs to teach building technology	3.98	1.030	A	4.32	0.776	SA
10.	Use ICTs to teach TVET subjects	4.19	1.040	A	4.21	0.725	A
	Grand Mean	**4.13**	**0.890**	**A**	**4.19**	**0.830**	**A**

Where: $\bar{X}_L$ = Mean of TVET Lecturers; SD_L = Standard Deviation of TVET Lecturers; $\bar{X}_S$ = Mean of PG Students; SD_S = Standard Deviation of PG Students; SA = Strongly Agreed; A = Agreed

Data in Table 2 revealed that TVET Lecturers had a mean range of 3.98-4.40and standard deviation range of 0.65 - 1.04. While the PG Students had a mean range of 4.40-4.39and standard deviation range of 0.72 - 0.94. The standard deviation shows that the respondents are close in their responses. The mean showed that the respondents agreed that specialized use of ICT-mediated learning skills are required for delivery of technical vocational education and training in a pandemic era in Universities in Rivers State.

Table 3: Mean and Standard Deviation of the Respondents' Responses on the ICT Literacy Skills Required Required for Safe and Efficient Content Delivery of TVET

S/N	Items	TVET Lecturers			PG Students		
		$\bar{X}_L$	SD_L	RMK	$\bar{X}_S$	SD_S	RMK
1.	ICT for professional Teacher Development	3.57	0.692	A	3.99	1.088	A
2.	Specific occupational skills;	3.56	0.732	A	4.05	0.990	A
3.	Specific occupational knowledge	4.31	0.798	A	3.81	1.039	A
4.	Programme planning, development, and evaluation	4.28	0.750	A	4.11	0.859	A
5.	Instructional planning	3.93	1.004	A	4.16	0.924	A
6.	Instructional execution	4.16	0.941	A	4.35	0.719	A
7.	Instructional evaluation	3.95	0.875	A	3.95	0.932	A
8.	Instructional management	4.25	0.931	A	4.42	0.844	A
	Grand Mean	**4.25**	**0.970**	**A**	**4.10**	**0.780**	**A**

Where: $\overline{X}_L$ = Mean of TVET Lecturers; SD_L = Standard Deviation of TVET Lecturers; $\overline{X}_S$ = Mean of PG Students; SD_S = Standard Deviation of PG Students; SA = Strongly Agreed; A = Agreed

Data in Table 3, revealed the responses of both TVET Lecturers and PG students. The TVET Lecturers had a grand mean of 4.25 and a standard deviation of 0.97 and PG Students has a grand mean of 4.10 and a standard deviation of 0.78 which indicates that both students and TVET Lecturers agreed that ICT literacy skills are required for delivery of technical vocational education and training in a pandemic era in Universities in Rivers State.

Table 4: t-test of the Difference between the Mean Responses of the Respondents on the ICT Skills Required for Safe and Efficient Content Delivery of TVET

Group	N	$\overline{X}$	SD	Df	t-cal	t-cri	Decision
TVET Lecturers	60	3.99	0.22				
				298	1.22	1.96	Accepted
PG Students	240	4.10	0.16				

Data in Table 4 revealed that t-cal (1.22) is less than t-crit (1.69) at 0.05-degree level of significance. Therefore, the null hypothesis was accepted hence there is no significant difference between the mean responses of lecturers and postgraduate students on information and communication skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

Table 5: t-test of the Difference between the Mean Responses of the Respondents on the Specialized Use of ICT Skills Required for Safe and Efficient Content Delivery of TVET

Group	N	$\overline{X}$	SD	Df	t-cal	t-cri	Decision
TVET Lecturers	60	4.10	0.29				
				298	1.16	1.96	Accepted
PG Students	240	4.19	0.28				

Data in table 5 revealed that t-cal (1.16) is less than T-crit (1.96) at 0.05-degree level of significance. Therefore, the null hypothesis was accepted hence there is no significant difference between the mean responses of lecturers and postgraduate students on specialized use of ICT-mediated learning skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

Table 5: t-test of the Difference between the Mean Responses of the Respondents on the ICT Literacy Skills Required for Safe and Efficient Content Delivery of TVET

Group	N	$\overline{X}$	SD	Df	t-cal	t-cri	Decision
TVET Lecturers	60	4.12	0.59				
				298	-0.44	1.96	Accepted
PG Students	240	4.09	0.41				

Table 6 revealed that t-cal (-0.44) is less than t-crit (1.96). This indicates that the null hypothesis is accepted. Thus there is no significant difference between the mean responses of lecturers and postgraduate students on ICT literacy skills required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State.

Findings and discussion

Findings of the study revealed that information and communication skills are required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State. Findings of the study is in agreement with Aguiar, Velázquez, and Aguiar (2019) who identified the skill need of computer education students for software development such as proper mouse handling, good typing skills, programming syntax skills, error detection skills among others. The study is also in agreement with opinion of Alemu (2015) who found out that vocational education graduates require spreadsheet skills, word processing, and electronic office operations.

Findings of the study showed that specialized use of ICT-mediated learning skills are required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State. Findings of the study is in line with Almerich, Orellana, Suárez-Rodríguez, and Díaz-García (2016) who highlighted a short list of fundamental skills that every college graduate should possess to increase overall digital know-how from basic coding such as the ability to set up a Wi-Fi network, the ability to back up to the cloud, Basic photo editing, Basic video editing, Google docs and Microsoft Office, HTML and basic coding.

Findings of the study showed that ICT literacy skills are required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State. Findings of the study is in agreement with Al-Shwabkah, Hamad, Taha, and Al-Fadel (2016) where it was out that using digital assessment tools to create quizzes and be able to detect plagiarized works in students assignments digital skills that can be used to evaluation/assessment classroom instruction in form of quiz or any other form of assessment given to the students before, during and after instruction. The findings of the study support Area (2018) who emphasized that teachers require online teaching skills, which involves transferring of knowledge through internet, holding discussion class, sending e-mails giving and assessing students' performance.

Conclusion

Education is a process of training designed to give knowledge, develop skills and abilities that could lead to the development of mental alertness and the right attitude to life. TVET refers to education and training given to the learners to acquire skills, knowledge and attitude needed in the world of work and necessary for employment in an occupation. Digital skills, according are the perspective of the new educational training, with a clear objective of educating and preparing students, allowing them to appropriate themselves of new ICT knowledge, tools that serve to include them within the educational system. The outbreak of Coronavirus negatively affected educational activities worldwide. Coronavirus Pandemic affected educational systems worldwide, leading to the widespread closures of schools. Though, technology can be used to remedy some of the fallouts from school closures, but it cannot replace the important effect of face-to-face interactions by students and teachers. Besides, many students do not have the necessary access to supportive technologies which makes it harder to maximize the potentials of learning technology during school closures. This gave rise to acquisition of digital skills. Findings of the study revealed that information and communication skills, specialized use of ICT-mediated learning skills, ICTs programme support skills and ICT literacy skills are required for delivery of technical vocational education and training in a pandemic in Universities in Rivers State thus there is need for TVET lecturers acquire online teaching skills, which involves transferring of knowledge through internet, holding discussion class, sending e-mails giving and assessing students' performance.

Recommendations

1. Training sections should be organized for all TVET lecturers on the effective use of the digital skills in the classrooms.
2. TVET lecturers should be encouraged by the concerned authorities to use the skills and other available pedagogical technologies during instruction of practical before field experience.

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SUB-THEME 2

CONTENT DEVELOPMENT OF TVET IN THE ERA OF COVID-19 PANDEMIC

OPEN AND DISTANCE LEARNING: THE NIGERIA EDUCATION STRATEGY

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Abstract: *Nigeria, Africa's greatest densely inhabited nation has a population of over 200 million people. Like most sub-Saharan African countries, the higher education participation rate is pessimistically low, with only a worthless 8.5% of the qualified regiment of 18-30-year-olds being favourable to partake in Higher education. By a crushingly slanted liking for university education over technical and vocational education, the university sub-sector is under the vast burden, making insufficient access to university education, a recurrent problem that appears almost inflexible. Despite the best efforts of government and other stakeholders, including but not limited to the establishment of more universities, approval of affiliation between universities and Colleges of education for purposes of awarding degrees in the field of education, an increase of admission quota in various universities, insufficient access endures to affects the Nigerian higher education territory like a giant.*

Keywords: *Open & Distance Learning, Higher Education, Information & Communication Technology*

Introduction

The Nigerian education system has undergone a great revolution since its modest beginnings with the founding 1948, of the University of Ibadan as a college the University of London, The problem of insufficient access to higher education in Nigeria is best typified by the severe imbalance between the demand and supply sides of the Nigerian education system equation. For instance, 1,338,687 candidates sat for the 2021 nationally organized Unified Tertiary Matriculation Examination whereas the existing 422 tertiary institutions in Nigeria can only absorb a maximum of about 600 to 700 new entrants. This vast gap between demand and supply is recurrent in response to which successive Nigerian governments have over the years, taken several steps, the most important being between 2020 and 2021 with the establishment of more tertiary institutions. It is appropriate to mention that the increase in the number of universities notwithstanding, the imbalance persists, as the private universities put together account for less than 5% of total student enrolment in the Nigerian University System with the 45 Federal universities accounting for about 75% of total student enrolment. Throughout this period of democratization and return to civil rule-following years of military interruption, private providers were invited to partake in the provision of tertiary institutions of education. Accordingly, between 2020 and 2021, 02 Federal universities and 20 private universities were licensed by the government with 20 of them established in 2021 alone.

Currently, the Nigerian University System consists of one hundred and ninety-seven (197) universities (45 Federal-, 53 State and 99 Private) with a total student enrolment of about 2.1 million in the conventional face-to-face mode. This development of establishing new universities in response to the rising and largely unmet demand for university placements has continued unabated to the extent that between the periods 2011 to 2021, a total of 26 universities were established (about 13.2% of the total number of universities). So forth influence these new universities would ultimately make in terms of enhancing access, would take quite some time taking into consideration their carrying dimensions as resolute by influences such as teacher: student ratio, and the accessibility of suitable space as well as infrastructural and corporeal facilities. In the intervening time, the population of latent university graduates who exit secondary schools remains to raise exponentially. This situation in the tertiary institutions calls for a model shift and the mainstreaming of the Open and Distance Learning (ODL) mode as a balancing modality for if access to quality education for the crowded common people of the Nigerian child if the nation is to produce the critical mass of highly skilled human power to drive the various sectors of the Nigerian economy -a pre-requisite to the attainment of the country's laudable developmental objectives such as the vision of the sustainable development goals (SDGs) and the revolution agenda of the current administration.

The Nigerian education system and the problem of inadequate access

To support the seeming lack of impact of the continuous increase in the number of conventional "element and cement" universities on the improvement of the recurrent inadequacy of access to university education, let us look at the most recent effort by the Federal Government to tackle the perennial problem of inadequate access through the establishment of 02 and approval of 20 i.e. two-plus twenty (2+20) Universities. Two of the new Federal universities are Federal University of Health Technology, Otukpo Benue State, & Federal University of Agriculture, Zuru, Kebbi State while twenty of the private universities were also approved, are Topfaith University, Mkpatak, Akwa Ibom State, Thomas Adewumi University, Oko-Irese, Kwara State, Maranatha University, Mgbidi, Imo State, Ave Maria University, Piyanko, Nasarawa State, Al-Istiqama University, Sumaila, Kano State, Mudiame University, Irrua, Edo State, Havilla University, Nde-Ikom, Cross River State, Claretian University of Nigeria, Nekede, Imo State. NOK University, Kachia, Kaduna State, Karl-Kumm University, Vom, Plateau State, James Hope University, Lagos, Lagos State, Maryam Abacha American University of Nigeria, Kano State, Capital City University, Kano State, Ahman Pategi University, Kwara State, University of Offa, Kwara State, Mewar University, Masaka, Nasarawa State, Edusoko University, Bida, Niger State, Philomath University, Kuje, Abuja, Khadija University, Majia, Jigawa State, Anan University, Kwall, Plateau State. It is useful to note that the average number of students matriculated by each of these new Federal universities in the first year was 350 students (a combined total of seven hundred students enrolled by the two universities) and that of twenty private universities maybe one 100 hundred students each – this number could easily be enrolled in one open university without conceding quality within the context of the flexibility and economies of scale of the Open and Distance Learning (ODL) approach.

Open and distance education in Nigeria

Open and distance education, most of the correspondence diversity, is not novel in Nigeria. The history of educational development in Nigeria is complete with success stories of famous Nigerian forerunner university alumni most of whom got their grades, against great odds, through home study and correspondence education from the admired exterior system of the University of London, amongst others and was later admitted into best careers such as accountancy and law. From the policy viewpoint, there is a plentiful indication that succeeding Nigerian governments have long understood the reputation of open and distance learning. The Nigerian National Policy on Education identifies the place of open and distance learning in attaining lifelong education and sustains that lifelong education shall be the basis of the nation's education policy with openings for personalities to select between on-going full-time studies, joining work with study, or get on full-time work without excluding the vision of continuing studies later (Federal Republic of Nigeria, 2013). This policy on open and distance learning (ODL) has continued to be supported by succeeding administrations. The National Policy on Education which foreseen the growth of open and distance learning programs in the country defined open and distance education as the mode of teaching in which learners are removed in time and space from the teacher and which uses a variety of media and technologies to deliver and/or advance access to decent quality education for a huge integer of learners anyplace they could be. Giving to the policy text, the objectives of open and distance education are to:

1. Offer access to quality education and fairness in educational prospects for those who else would have been deprived of.
2. Encounter the distinct wants of employers by rising special certificate courses for their employees at their workstations.
3. Inspire internationalization particularly of tertiary education prospectuses.
4. Upgrade the consequence of internal and external brain trench in tertiary institutions by using specialists as educators irrespective of their sites or places of work. (FRN, 2013).

Nevertheless. a precarious assessment of the scope of open and distance learning practice at any level of education in Nigeria against the backdrop of the long-standing recognition of its potential for increasing access to education for all socio-cultural groups, unfortunately, reveals a glaring mismatch between policy and practice even in the face of the obvious and widely acknowledged recurrent inadequacies of the conventional face-to-face mode, in meeting the higher educational ambitions of a huge figure of Nigerians, particularly in the university sub-sector. Although the NPE envisages the placement of the ODL mode at all levels of education in Nigeria, from primary to tertiary education with the establishment of open schools, open colleges, open polytechnics, and open universities, unfortunately, eras after the pronunciation of the policy, only the university sub-sector/ National Teachers' Institute has accomplished to device the ODL policy to a noticeable degree, although the operation and rehearsal of the delivery through the mode, is quite a distant call from anything is required to fully enhance the method, inside the framework of modern-day, information and communication technology(ICT)- single-minded transfer of flexible, cost-effective, reachable and reasonable education without the limitation of interval and interplanetary.

Open and Distance Learning in the Nigerian education system

In modern times, there has been a great increase of attention in the open and distance learning mode among Nigerian universities and the National Teachers' Institute as a result of Coronavirus (COVID-19). The drivers of this brand-new, nearly crucial wish by many universities/ National Teachers' Institute to offer degree programs by the distance learning mode, is not far-fetched. By the likely exemption of the few universities which may be genuinely intense on bidding to amends the inequity amid mandate and quantity already highlighted in the previous sections, as well as in expanding their mode of distribution by presenting the open distance and e-learning (ODeL) mode, to influence on the novel technologies, the mainstream of universities indicating interest in ODL, are pushed by the suspension obligatory by the National Universities Commission on part-time programs in the Nigerian university system. However, the National Teachers' Institute has been on this system (ODL) as back as 1978. In the awaken of the ban on admission into part-time programs, and the understanding of the negative impact of the ban, on the internally generated revenue (IGR) profile of the affected universities which rely heavily on the part-time programs as "cash cows", several universities began making inquiries about the procedure and requirements for the establishment of ODL programs apparently, as a swift shot answer to the awful condition of decreasing IGR from the most deprived quality part-time programs which National Universities Commission (NUC) had fairly arguably closed down. Consequent upon written indication of interest in bringing programs by the ODL mode, is suitably advised by the Commission, on the process and necessities for the founding of distance learning centres (DLCs) which upon approval, may be approved to run degree programs on a case-by-case beginning within the context of the "Procedures for Open and Distance Learning in Nigerian tertiary institutions".

The Open and Distance Learning (ODL) model in the Nigerian education system

The classical open and distance learning in Nigerian tertiary education system is ICT-enabled and maintained mixed learning model. It was designed with the awareness the Nigerian context to pledge worldwide suitability in the following ways:

1. ***The significance of Sequence/ Learning Materials*:** The model places a very high top on the centrality of course materials as a strong standby for the teacher. Therefore, it is vital among other things that course materials should be developed not by only authors but by course design teams involving subject staff specialists, specialists in ODL pedagogy, instructional designers, and ICT support workers. For such materials to be measured satisfactorily, they must be carved in a simple, learner- centre, and familiar style. The learning materials which are expected to be rich enough to arouse and inspire active wisdom should also be collaborating, with in-text drills and tests/ games. A content of modified ODL course materials in the tertiary education system is that they should be developed in a cycle with the ethics agreed in the suitable Benchmark Minimum Academic Standards (BMAS) for the specific sequence/database.

2. ***The Access Support*:** In totalling to owning the characteristics emphasized above, course materials should be accessible in varied media format i.e. print and electronic including video and audiotapes, CD-ROMs, DVD, USB sticks, on the Institute/University's website or learning management system, mp3 format, mobile format, etc. The basis behind this obligation is to safeguard that learners are not deprived of access to learning materials or side-lined as a result of the encounters of insufficient power supply, underprivileged internet bandwidth, and incomplete access to the internet or computers anywhere the learners could be. Accessibility of quality course materials in varied media format is seen as a way of safeguarding that course materials are obtainable in a 'bouquet' or 'hamper of treats' in which each student, irrespective of his/her socio-economic condition or environmental situation, will find a little beneficial at any time or place on terms of learning materials during their learning trip.
3. ***The Placement of Technology***: The model of ODL in the Nigerian tertiary education system is based on the belief of 'suitable technology', agreed on the fact that technology is accessible in a varied range from" low–end" to "high-end" technology. In adding, enchanting awareness of the fact that Nigeria currently faces substantial infrastructural encounters mostly in terms of internet and power supply bandwidth which could influence against the enormous placement of technology. Whatever ODL institutions are being invigorated to do, is to influence technology to advance the competence of teaching and learning with steady and step-wise incorporation of technology from the low-end to the high-end. Existence mindful of the Nigerian situation, and the conditions of the ordinary learners are critical in the advance of course materials and in determining the set-up of arrangement/ transfer of such materials. For example, we frequently counsel thoughtfulness in the design of course materials entrenched with video pins eloquent fully well that the normal learner in Nigeria may not have the right to use adequate bandwidth to download such resources. The largely low digital eloquence of many Nigerian academics is the additional motive why the ODL model in the tertiary system of education does not lay undue importance on technology per se, but on the submission of technology that is suitable to the situations of the learners and teachers, to adequately advance teaching and learning within the context of a quality tertiary system of education that is stretchy, available, impartial and reasonable, the all-embracing neutral being to promote and encourage a gradual but stable mixing of ICT into teaching and learning in the tertiary system of education to gather a life-threatening mass of Nigerian academics in our ODL organisations who are adequately digitally confident as to influence ICT to brand teaching and learning adequately worthwhile.
4. ***Face-to-face Module***: The model of ODL in the tertiary institutions/National Teachers' Institute is a mixed arrangement that has a vital face-to-face module that is compulsory, at least the feature around summative assessment or end-of-semester examinations. The tertiary education system Guidelines on open and distance learning while identifying the need to free learners from the limitations of time and space, still requires that learners interrelate with tutors in the institutions at least thrice in a semester for a period not more than 3-4 weeks for resolutions of revision and examination which must be engaged face –to face with students being existing to write their examination. In this respect, the guidelines are fairly clear that the tertiary education system model is not e-learning or solely online education. By the same token excessive "contact" with students reminiscent of the weekend lecture format of part-time programs, is prohibited. It is also clearly stated that tutorials during which lecturing takes place, are not acceptable within the context of distance learning, as the guidelines stipulate that tutorial facilitation whenever they take place face-to-face, are to be restricted to the "clarification of concepts" with the tutorial facilitators not playing the "sage on the stage" role but acting as "guides on the side" to ensure that students are on the right track in the pursuit of knowledge. Such interactions should not involve the simple transmission of knowledge from educator to student, instead, they should involve various forms of student support such as peer group discussions or practical. In this submission, the National Teachers' Institute has been on this for a decade as back as 1978.

5. ***Learner Support***: Learner support in the context of the ODL model in the tertiary education system means vigorous sustenance in all consequences negotiating the whole student learning trip. It is anticipated that institutions would provide ICT-enabled support to cater for both academic and social aspects of the students learning experience in a mixed format [online, offline, and face-to-face, including mentoring by the information advice and guidance (IA&G) personnel. The modalities for learner support are expected to be varied including the use of mobile phones for SMS texts, chat forums, blogs. 24 hours help desk, bulletin boards, and notice boards, to amend the problem of separation that distance learners are used to know-how. Student-student (Peer) support is also encouraged through the use of social media such as Facebook, Twitter, course facilitators guide, etc.

Open and Distance learning education system in Nigeria

In rapports of open and distance learning, the Nigerian education System presently has National Teachers' Institute and one single-mode open university- the National Open University of Nigeria (NOUN) as well as six dual-mode universities [conventional universities with distance learning centres] i.e. the Universities of Ibadan, Lagos, Abuja, Maiduguri, Obafemi Awolowo University, Ile-Ife and Federal University of Technology, Yola. Student enrolment in the distance learning programs of these National Teachers' Institute has decreased slightly from **57,267** in 2018 (Field Operations and Students Services Department, 2018) to **49,511** in 2019 (Field Operations and Students Services Department, 2019). The Institute has great prospective to bid more openings for the qualitative education system to the crowded grassroots of Nigerians, as efforts are presently being made to put in place a robust learning management system (LMS) with capacity building for facilitators and more effective learner support mechanisms to guarantee that students are guided and motivated throughout their learning trips. It is projected that with these and the ongoing efforts to improve on the quality and quantity of course materials, the targeted total enrolment of one hundred thousand (100,000) students by the National Teachers' Institute devoid of the jeopardy of disheartening quality, is surely attainable.

Table 1: Student Enrolment in Open and Distance Learning Programs in National Teachers' Institute in 2018 into Six Geo-Political Zones in the Country

ZONE	ENROLMENT											
	NCE				B.Ed/ BA.Ed						ADE	PGDE
	NCE I	NCE II	NCE III	NCE IV	TOTAL	100L	200L	300L	400L	TOTAL		
N/C	3406	2696	5417	3533	15052	704	1050	586	856	3196	50	1688
N/E	450	259	797	541	2047	69	103	72	285	529	0	159
N/W	2109	1250	4070	2735	10164	240	535	310	704	1789	12	575
S/E	561	401	1044	928	2934	28	69	57	271	425	2	1050
S/S	1439	1073	2346	1858	6716	82	339	230	673	1324	36	1614
S/W	479	405	699	553	2136	492	1131	1027	1147	3797	1	1971
TOTAL	**8444**	**6084**	**14373**	**10148**	**39049**	**1615**	**3227**	**2282**	**3936**	**11060**	**101**	**7057**

Where: NCE = Nigeria Certificate in Education,

B.Ed/ BA.Ed. = Bachelor of Education/ Bachelor of Arts Education,

ADE= Advance Diploma in Education,

PGDE = Post Graduate Diploma in Education

Grand Total = NCE+ B.ED/BA ED. + ADE + PGDE

= 3,9049+ 11,060+101 +7,057 = **57,267**

Table 1: Student Enrolment in Open and Distance Learning Programs in National Teachers' Institute in 2019 into Six Geo-Political Zones in the Country

ZONE	ENROLMENT												
	NCE					B.Ed/ BA.Ed					ADE	PGDE	PTTP
	NCE I	NCE II	NCE III	NCE IV	TOTAL	100L	200L	300L	400L	TOTAL			
N/C	3224	3406	2696	3129	12455	1133	704	1050	586	3473	11	1818	36
N/E	546	450	259	365	1620	285	69	103	72	529	4	327	3
N/W	2152	2109	1250	1765	7276	753	240	535	310	1838	9	1301	29
S/E	438	561	401	593	1993	96	28	69	57	250	3	1241	10
S/S	1118	1439	1073	1453	5083	345	82	339	230	996	4	2207	37
S/W	322	479	405	417	1623	771	492	1131	1027	3421	8	1898	8
TOTAL	**7800**	**8444**	**6084**	**7722**	**30050**	**3383**	**1615**	**3227**	**2282**	**10507**	**39**	**8792**	**123**

Where: NCE = Nigeria Certificate in Education,

B.Ed/ BA.Ed. = Bachelor of Education/ Bachelor of Arts Education,

ADE= Advance Diploma in Education,

PGDE = Post Graduate Diploma in Education

PTTP = Professional Teacher Training Programme

Grand Total = NCE+ B.ED/BA ED. + ADE + PGDE

= 3,0050+ 10507+39 +8792+ 123 = **49,511**

Trials of Open and Distance Learning in the Nigerian Education System

An examination of the situation in the distance learning institution in 2008 before the advent of the ODL model, exposed that the transfer of quality education system by the open and distance learning mode in the Nigerian Education system was burdened by capacity gaps at the institutional (universities) and regulatory (National Universities Commission) levels. In the face of the glowing qualities of distance education, this mode is still watched down upon by some people as sub-standard to the conventional teaching and learning procedures (Braimoh & Lekoko, 2005). This poor insight and low regard in which distance learning is held by the general public is one of the frequent encounters antagonising open and distance learning in the Nigerian Education system. These challenges include institutional capacity gaps about:

1. ***Insufficient Course kinds of Stuff*:** Insufficient course resources was the main contest fronting the actual execution of open and distance learning in the Nigerian Education system to the level that in one of the institutions, a plain scarcity, of course, stuffs caused in academic inaction as students were incapable of growth to advanced stages of educations. In some suitcases, the current course kinds of stuff were not precisely designed to the singular wants of the distance learner for self-determining, self-study since they are not adequately communicating and self-instructional. There was also self-same slight assortment in terms of media of presentation with a majority of written resources.
2. **Weak Learner Support System:** Learner support services were under par in numerous of the establishments, the main difficulty being that of meager ICT infrastructure. There was also a shortage of facilitators and guidance counsellors in some of the learner support centres. In some of the dual-mode establishments, the study (learner support) centres lacked enthusiastic facilities and the distance learning programs were obliged to share human and material possessions with the rest of the host institutions all over the country. In a setting of generally overstrained facilities, it is easy to figure out the kinds of limitations which the open and distance learning programs have to struggle with.

3. **Unsuitable Provision Instruments:** At a distance from problems connected to the matters of course materials, there were also trials about conveyance. Some of this re-count to the absence of appropriate execution of the facilitation procedure. In some of the dual-mode centres, tutorial facilitation was more of lecturing than discussions to explain concepts and provide an opportunity for peer support, than facilitation takes place, thus making it difficult to differentiate between distance learning programs and part-time programs of the face-to-face mode. Naturally in the dual-mode Education system, academic staff are drawn from the conventional (face-to-face) programs from the environment where the centres are situated or other proximate areas, but in some circumstances, such staff was employed to partake in the distance learning programs seemingly without any distinct training or re-orientation to organise them for the strange loads and prospects of the open and distance learning instructional modality.

Conversion of the ODL landscape: Upholding ICT-enabled strategy

To convert the scenery of ODL in the Nigerian Education system careful actions were engaged to address the contests emphasised above. To this conclusion, the National policy on Education set the apparatus in gesture, to bring the practice of Distance Learning in the Nigerian Education system up to the standard of worldwide pre-eminent exercise so that Nigeria could efficiently enhance the ODL mode in perfecting the plain difficult of an insufficient right of entry to the tertiary education system. The first step on the way to the understanding of this aim was the summoning of a stakeholder's workshop to mode out a model of open and distance learning that would take the individuality of the Nigerian context into account while drawing from worldwide best applies. This led to the development of the tertiary institutions " Guidelines for open and distance learning in Nigerian Education system" in 2009 which set out standards for revalidation or certification to support quality in course design and assessment; use of technology; learner support; staffing and finally information, guidance, and direction. This was followed by agreement steps to fill the capacity gaps exhumed by the condition examination and to build professional capacity in the system. In chase of this aim and conscious of the great benefit of partnerships and collaboration, NUC teamed up with the Open University, UK, and British Council Nigeria and launched the Open and Distance Learning (ODL) Scheme. The ODL scheme which accepted a 'train the trainers' approach, involved the training of key academic staff drawn from six Federal universities with existing dual-mode delivery, identified specific outcomes, milestones, and deliverables [up-scaling the practice of ODL in NUS to the standard of global best practice] with a clear road map on implementation i.e. an integrated program for five face-to-face capacity-building workshops and ongoing networking activities on-line and offline, between workshops, all facilitated by staff of the Open University of the United Kingdom(UK).

To foster ownership of the scheme, an Executive Group was established with a membership of Directors of the distance learning centres of the six universities concerned, to guide the direction of the scheme. The decisive objective of the scheme was the emergence of a Centre of Excellence for Distance Learning in Nigeria. Other outcomes were anticipated such as the development of a critical mass of personnel within the NUS who have been inducted in ODL and can continue working in their institutions as change agents and members of a national network of trainers to ensure cascade training in their respective universities. The training was also expected to build a network of Nigerians, capable of devising and delivering distance learning resources that would contribute to a national course and resource production plan. A website containing project resources and links to the distance learning units of participating universities was developed. A major outcome of the scheme was the development by participants, of course, materials relevant to the Nigerian context. These contextualized guides to distance learning included e-modules and ODL course materials for all General Studies (GST) courses taken by all first-year students in the Nigerian Education system. It was also predicted that the trainees would have gathered capabilities that would improve the quality and capacity of distance learning in Nigeria and would approve online and mobile technologies within an open and collaborative approach to course transfer.

Developments in Open and Distance Education

Globalisation and the keenness it has imposed upon all countries of the world does not cloister developing nations from the need to be modest. Regardless of whatsoever internal inconsistencies and unstable undercurrents separate developing countries are contending with a rival they must if they are to continue pertinent and not just discarding grounds of knowledgeable, deadly, and other methods of left-over. In this setting of globalisation, regrettably, numerous developing nations are wedged in a mystery of high prospects, low incomes, enormous illiteracy, deficiency, and now and then conflict and anxiety. For developing nations counting individuals in Africa to be actors in the worldwide economy despite the financial catastrophes in which most are entangled, a mode of education such as distance education is supposed for its cost-effectiveness, effectiveness in the enormous of education, and infiltration of hard to reach areas and inhabitants seems to bid "soft touchdown" and then becomes a nice-looking choice for administrations. It is significant to strain that despite this seeming charm, effective application of a maintainable ODL system needs enormous assets concerning human and substantial capitals, while it would include moderately lesser capital expenditure than the element and grout conservative style.

Deprived of a hesitation, Distance education is attractive more technology-intensive concerning bandwidth, hardware electronic platforms, software, processes, and applications including mobile telephone which has become an integral part of modern learning, effective student and academic controlling, and learner care. Outside the delivery of a healthy information and communication (ICT) groundwork, a life-threatening form of knowledgeable and well-trained personnel, knowledgeable in the details and shades of Open and distance learning, is a sine qua non for effective implementation of an ODL system that would fulfill the promise of effective, efficient, reasonable and nearby quality education which the open and distance learning style assurances. Since its modest early stages in the era of mail education, distance education has crossed an exciting course including the use of mass media- in the form of radio and television, to the transmission of learning materials via satellite television. As is the circumstance with other features of human effort the outline of information and communication technologies (ICTs) has transformed education, particularly distance education, altering teaching and learning in conducts certainly not formerly fictional. In deliberating these contests, it is necessary to extant them within the context of a time series or tendencies examination. In this respect, two periods should be eminent - The period before the advent of the tertiary institutions' guidelines on ODL in 2009 and the period post-2009 when the operationalization of the guidelines commenced and the beginning of reforms heralded by the implementation of the NUC/British Council ODL plan.

ICTs in distance education

Giving to Larry Johnson, Chief Executive Officer of the New Media Consortium (NMC) " considerate how to better incorporate online learning in face-to-face settings will be very life-threatening over the following year along with the idea that higher education institutions have to define policies about social media use to exploit the possibilities of these stages for teaching and learning (New Media Consortium, 2014). The 2014 New Media Consortium Horizon account classifies the mixing of online, mixture, and cooperative learning and the increasing ubiquity of social media as wicked inclinations driving disparities in higher education over the subsequent one or two years. The alteration from students as consumers to students as inventors and the increase of data-driven learning and valuation are mid-range drifts predictable to hasten technology usage in the subsequent four to seven years and nimble methods to alteration and the development of online learning are thought to be long-term tendencies. There is an overall salutation of some tests substitute as impairments to the typical use of technology in higher education, distinguished among these are low digital eloquence among academic staff and comparative non-existence of remuneration for teaching. These encounters however carefully soluble, are very life-threatening in developing nations like Nigeria where the digital divide between the ICT populaces (the students) and the ICT settlers (the lecturers) is fairly extensive bight.

Open Educational Resources (OER)

A powerful tendency in open and distance education today is the arrival and popularization of the open educational resources (OER) which are teaching, learning or research materials that are in the community domain or that can be used under an intellectual stuff license that permits re-use or adaptation such as the imaginative parks. The possibility of open educational resources for re-use and adaptation by everyone, particularly for those in resource-poor surroundings, is a countless chance to attain quality education for all (UNESCO, 2013). OER has arisen as a concept with countless possibilities to support educational change. Its transformative influence lies in the comfort with which such resources when digitized can be collected through the internet. Its educational worth, on the other hand, lies in the idea of using resources as an integral method of communiqué of the curriculum in educational progressions i.e. resource-based knowledge. The idea of Open Educational Resources denotes to some extent educational resources (including curriculum maps, course materials, textbooks, flowing videos, multimedia applications, podcasts any other materials that have been designed for use by educators and students, without an accompanying need to pay royalties or license fees (Butcher, 2011). They are digital materials that can be rummage-sale, recycled, repurposed for teaching, learning, research, and more, made freely obtainable online through open licenses such as inspired commons. OER includes a diverse variety of digital possessions from course materials, content module collections, and journals to digital pictures and videos fasteners (Higher Education Academy, 2014).

There have been consistent calls for continued dialogue, capacity building in implementation, and policy guidance for both governments and institutions on the promotion of quality teaching and learning particularly the significance of quality teaching and learning materials and the optimistic influence of OER on the quality of teaching and learning. Agreed on the datum that governments play a vital role in setting national policies which influence the allowing environments wanted to permit the deployment of OER to take roots adequately for institutions to influence them to improve the quality of education. In this respect, governments should make the enabling strategies and policy guidelines such as on copyright and knowledgeable stuff rights (IPR)- helpful funding governments, human resources, corporations, and available and vigorous ICT connectivity substructures by governments and organisations (Glennie *et al* 2012). In the global OER communal, there is the agreement, that decent exercise contains safeguarding educational materials industrialised employing public subsidy are accessible under an open license and that allotment educational materials bent using public subsidy has important latent to advance the quality and user-friendliness of educational transfer crosswise nation-wide higher education systems by making OER more willingly accessible for use by all higher education breadwinners, not just the receivers of the public reserves (Butcher, 2010).

NUC as the substance for OER implementation

The Commission endures showing its vital part as an advocate and substance of greatest repetition. In the zone of OER, the Commission is at the vanguard of encouragement and elevation of the implementation of OER. In the first occurrence, the Commission prepared stakeholders; encouragement workshop in 2013 to which all Nigerian education system were invited regardless of their proprietorship or whether or not they were previously involved in distance learning. The OER workshop absorbed informative Nigerian researchers about the idea of open educational resources, their meaning, uses, and sources including widespread deliberations on quality subjects in the practice of OER for teaching and learning. It was completed plentifully rich to partaking researchers that, while quality course material development remains one of the major challenges which ODL institutions are contending within Nigeria, OER should not be seen as the cure-all to the delinquent agreed the detail that most OER is developed not essentially as complete courses that may be used "as is" for entire degree programs, rather, they should be seen as "building blocks" for content development and in the Nigerian context, curriculum mapping may be required to ensure that the OER to be adapted complies in terms of content and context, with the necessities of the BMAS for the package or course under deliberation.

MOOCs and x-MOOCs

Massive open online courses (MOOCs) signify another of the novel modalities for teaching and learning. A massive open online course (MOOC) is a model for bringing learning comfortable online to some extent person who wants to take a course, with no limit on appearance. Further to old-fashioned course materials such as videos, audios, and readings, MOOCs offer a collaborating consumer opportunity that aids build a communal for students and lecturers. (Wikipedia, 2012). The first MOOC occurred from the Open education resources (OER) drive. The term MOOC was invented in 2008 by Dave Cormier of the University of Prince Edward Island and Senior Research Fellow Bryan Alexander of the Institute for Technology in Liberal Education in reply to a course named connectivism and collective knowledge also recognised as (CCK08) which was run by George Siemens of Athabasca University, Canada and George Downes of the National Research Council which was engaged by 25 tuition-paying students and 2200 students from the general unrestricted who compensated nonentity. Agreeing to Wikipedia (2014), the year 2012 developed the "year of the MOOC" as numerous well-financed breadwinners related with top universities such as Coursera, Udacity, and edX appeared.

An evolving tendency in MOOCs is the usage of non-traditional textbooks named E-Learning explicit novels to recover knowledge retaining. Some specialists honour the videos and other materials shaped in MOOCs as the subsequent method of schoolbooks (Young, 2013). The development of MOOCs takes control of the appearance of two separate kinds of MOOCS – those that replicate the connectivist philosophy and those which are more similar to the old-fashioned courses. To differentiate between these separate kinds, Stephen Downes recommended the footings cMOOCs and xMOOCs. On the fury close the dominance of MOOCs, Daniel (2012) records that "media fury surrounds MOOCs and profitable welfares partake enthused in. A sober examination is overcome by apocalyptic forecasts that disregard the history of previous educational fashions. Though the build-up almost MOOCs foretelling a revolt in higher education has absorbed on their gage, the real revolution is that universities with a shortage at the heart of their corporate models are acceptance openness". He struggled further that the Gadarene swiftness to proposal MOOCs may source universities to re-consider their tasks and stress extra on teaching quality, adding that eventually, MOOCs could make a welcome deflationary trend in higher education even though they are shrouded in myths and inconsistencies (Okebukola, 2013). Assumed the relative innovation of MOOCs in distance learning, it is not overall astonishing that they are not yet in full blossom in the Nigerian education system assumed the usually low digital eloquence of the academics.

There is nevertheless a root for cheerfulness that, in the not too aloof forthcoming more of the materials presently being advanced by the numerous progression development squads in our dual-mode education system within the outline of the Commission's continued persistence on greatest practice in the transfer of agendas by the ODL mode, MOOCs may ultimately become commonplace in the Nigerian education system and our universities would also be the share of the "Gadarene rush" to proposal MOOCs. A further hopeful opinion on the forecasts for MOOCs in the Nigerian education system was uttered by Okebukola (2013) when as part of forecasts on the part of open education in Nigeria's quest of vision 20:2020, he shaped a situation in which open education will be in full blossom in Nigeria and among other effects, the National Teachers' Institute fully organizes MOOCs and can propose instructional services to millions of Nigeria and when all universities, polytechnics, and colleges of education have the open courseware in the place where all lecture notes, lesson videos, and other instructional materials are accessible for free, too absorbed persons or groups in Nigeria and a different place in the sphere. This situation will produce important development in the quality of open and distance learning (ODL) in Nigeria and improve the country's forecasts of completely enhancing the open and distance learning mode in her expedition to perfect the recurrent tricky of insufficient admittance to the Nigerian education system, and its linked penalties for the growth of life-threatening human capital which Nigeria seriously wants to attain its nation-wide expansion aims.

E-Learning

It is relevant to state that OER is not identical with online learning or e-learning, while numerous people mistakenly use the footings interchangeably. Agreeably licensed content may be shaped in any intermediate. A lot of e-learning progressions may bind OER but this does not mean that OER is essentially e-learning (Butcher, 2011). Giving to Wikipedia, E-learning denotes the use of electronic media and information and communication technology (ICT) in education. Generally, e-learning includes all forms of educational technology in teaching and learning. E-learning is identical to multimedia learning, technology-enhanced learning, computer-based training, computer-based instruction, internet-based training, web-based training, virtual education, online education, etc. It includes numerous types of media that deliver texts, audio, images, animation, and streaming video and include technology applications and processes such as audio and videotapes, satellite TV, CD-ROM, and computer-based learning as thriving as intranet. E-learning can happen inside or outside the classroom, it can be self-paced asynchronous learning or may be instructor-led synchronous learning and is suited to distance learning and flexible learning but may be used in combination with face-to-face teaching, in which case the term mixed learning is more suitable. Worldwide, the start of e-learning is debatably one of the most influential tools accessible to address the wants of education.

M-learning

Mobile learning or m-learning is also an evolving tendency in open and distance learning across the sphere. Mobile learning offers modern ways to support the learning process through mobile strategies such as MP3 players, smartphones, and mobile phones, handheld and tablet computers. Mobile learning is emerging as one of the solutions to the numerous challenges facing education and is a veritable way of supporting formal and informal learning "on the go" and holds great potential for the delivery of education across the world. Mobile technologies are reasonable and have countless capacities in footings of accomplishment people who are relegated under their location and are thus appropriate for distance learning in a condition where admittance to education is frequently hard such as in Coronavirus Pandemic (COVID-19) conflict-ridden or post-conflict or disaster zones. M-learning is progressively commencement to advance pulverised in the conveyance of distance education in the Nigerian education system. For instance, in National Teachers' Institute, Kaduna, with State offices and centres across the thirty-six (36) States and Federal Capital Territory (FCT, Abuja), some of the course materials have been formatted to make them agreeable to mobile applications using Google Apps. The National Teachers' Institute, Kaduna has also deployed tablet computers pre-loaded with course materials, as part of the mixed-media format in which content is carried in the successively of some of the Centre's Degree and Postgraduate Diploma in Education (PGDE) programs.

Forthcoming forecasts of ODL in Nigeria education system

In the view of Okebukola's (2013) expansion along with open education, a path will continue at a dizzying pace in the approaching centuries. Technology is the main driver which daily, offerings novel views of chances, tools, and methods. The visions for the optimization of the ODL mode in the Nigerian education system for perfecting the recurrent imbalance between the demand and supply sides of the Nigerian education system are quite optimistic. By the constant revolution efforts being spearheaded by the National Universities Commission to encourage the development of the institutional and professional capacity to influence on ICTs and the evolving technologies, the flexibility, cost-effectiveness, user-friendliness which the open and distance learning mode foretell would be achievable. The persistence of the Commission on the upscaling of the standards of practice of ODL in the Nigerian education system and the quality of distribution of degree programs in cycle with the instruction in the benchmark minimum academic standards would guarantee that going onward, admittance to the Nigerian education system would be improved without miserable the quality of the requirements of ODL organisations.

Conclusion

The foundation of open and distance education in Nigeria having been laid through the National Policy on Education as far back as 1977, following the government's search for substitute models to the out-of-date conservative system, which had been found, even at that time, to be rather limited and imperfect in scope. The National Teachers' Institute, Kaduna remains committed to promoting the deployment of modern technologies and tools to upsurge the variety of modalities for bringing quality education system in the Nigerian education system. The applicability of e-learning gears is a welcome development for drives of ornamental admittance to people who previously would have been depressed of education under the distance of education. For these people, the option of "computer-generated connections" to educational institutions, opens new panoramas and new promises for self-actualization. The forthcoming of open and distance learning in the Nigerian education system is cheerful with the building of versatile ICT capable academics and other staffs who can influence the evolving technologies which have confirmed to be game-changers, creating amazing consequences in footings of additional effective teaching/learning connections foremost to additional productive learning consequences. This situation will produce important development in the quality of open and distance learning (ODL) in Nigeria and improve the country's forecasts of completely enhancing the open and distance learning mode in her expedition to perfect the recurrent tricky of insufficient admittance to the Nigerian education system, and its linked penalties for the growth of life-threatening human capital which Nigeria seriously wants to attain its nation-wide expansion aims.

Recommendations

1. The expansion of a life-threatening quantity of facilitators/ teachers with necessary skills and capability in ICT-enabled teaching in the Nigerian education system will not only guarantee suppleness in the transfer of quality distance learning programs accomplished of eliminating the distance from distance learning, but it will also improve the quality of distance learning practice casing the whole range of open and distance learning.
2. Additional numerically easy academics would also be more contented singing the part of" Leader on the side", rather than the "wise on the phase" – an example shift obligatory by modern ICT-enabled teaching and learning connections. Such skilled and capable staff would also be improved located to yoke the countless abilities of open educational resources (OER), Massive open online courses (MOOCs), and other digital resources and present them in a diversity of media suitable to the conditions of beginners.

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FACTORS AFFECTING PSYCHOSOCIAL WORK, ERGONOMIC RISK AND CUMULATIVE TRAUMA DISORDER OF WORKERS AT CONSTRUCTION SITES IN NORTH-EAST, NIGERIA

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Abstract: *The paper seeks to investigate those factors affecting psychosocial work, ergonomic risk and cumulative trauma disorder of workers at construction sites in North-East, Nigeria. Two research questions were formulated to guide the study.The design for this study was a descriptive survey research design and it was carried out in North-East geo-political zone of Nigeria. The population of this study comprises of all the construction workers in these six states, who are engaged in active site works between the months of January to June 2021. Purposive random sampling was employed to arrive a sample of forty (40) construction workers within two state in the area under study. The instrument used for data collection was structured questionnaire developed by the researchers based on five-points Likert type scale. The instrument was validated by three experts and a reliability of 0.71 was obtained using Cronbach Alpha reliability method. Mean and standard deviation was used to answer the research questions. Findings of the study revealed, among others, that psychosocial work has tremendous effects on construction workers at construction sites in the North-East, Nigeria. Hence, it was recommended that some activities in construction industries should be redesigned to suit the workers for the benefit of their health, activities should be performed at a suitable height to avoid an awkward postures in a workplace, ergonomic risk free environment should be maintained for the safety of workers and tools/ equipment.*

Keywords: *Psychosocial Work, Ergonomic Risk, Cumulative Trauma Disorder, Construction Work*

Introduction

The most common problems prevailing among workers in construction industries nowadays is high prevalence of psychosocial work and ergonomic risk factors. The term psychosocial according to Gale Group Encyclopedia of Medicine (2008) is a term referring to the minds' ability to consciously or unconsciously adjust and relate the body to its social environment. It may refer to a person's psychological development in, and interaction with a social environment, psychosocial was also viewed by and explained by medical dictionary for health, professionals and nursing as an aspect involving psychological and social aspect such as age, education, marital history among others. Other view on psychosocial by Therefore, psychosocial factor can simply be explained as relationship issues, negative past experiences and depression as well as drug and alcohol. It is also a psychosocial variable, social factor which includes other factors at the level of human society. This factor has significant effect on workers' stress and cumulative trauma disorder (CTD) which occurs due to tremendous repetitive action by workers in construction industries. Several researches were conducted in some other factories like meat factory, automobile assembly factory, soap making factory, mining industry, forestry, block/bricklaying work, foundry work, automobile assembly and metal working trades and other production factories where some repetitive actions are experienced. Pam, (2013) defined psychosocial factors as social and environmental influences that affect an individual's or group's mental health and behaviour. Psychosocial factors at work refer to interactions between and among work environment, job content, organizational conditions and workers' capacities, needs, culture, personal extra-job considerations that may, through perceptions and experience, influence health, work performance and job satisfaction. Organizational factors are representative of occupational concerns. Workers' reactions depend on factors such as their abilities, needs, expectations, culture and private life. These human factors may change over time reflecting adaptation among other influences. A negative interaction between occupational conditions and human factors may lead to emotional disturbances, behavioral problems, and biochemical and neuro-hormonal changes, presenting added risks of mental and physical illness.

Adverse effects on job satisfaction and work performance can also be expected. An optimum balance between human factors and occupational conditions would suggest a psychosocial situation at work having a positive influence, particularly as it relates to health. Consequently, ILO-WHO (1986) categorised psychosocial factors in to positive and negative; it further revealed that psychosocial factors can act as health-maintaining and health-enhancing agents. The most common approach in dealing with the linkages between the psychosocial work environment and workers' health has been the application of the stress concept. In developing and industrialized societies, both work and living environments can be major sources of adverse psychosocial factors which result in stressful experiences. This is due to repetitive actions performed by that body parts. There are some assertions that workers in the construction industries, universities and hospitals whose occupations demands high physical strains were usually absent from work, significantly more often due to low back pain than those with light physical work. Physical load like patient handling tasks have been associated with low back pain, (Naddin 2017). The relative importance of psychosocial factors in causing stress-related diseases may vary widely in individuals and in different population groups.

Cumulative Trauma Disorder (CTD), Cindy, (2018) is seen as one of the biggest silent dangers lurking in an organization. In fact, it is one of the common disease affecting workers especially in the construction industry that is usually caused due to repetitive actions along their work. Cumulative Trauma Disorder develops through repetitive motion, sitting, bending reaching, stretching, or lifting for several hours every day several days each week creates "micro-traumas" on workers' body.The body needs adequate time to heal and rest from the work it performs and when it is unable to fully recover and repair before it must work again, then trauma begins to develop. Over time, these traumas manifest themselves as CTD. According to Leon Kandoko (2017), brick manufacturing processes in United State (US) are ranked in the top 10 of highest job classifications that incur high percentage of cumulative trauma disorders claims. Workers' health is paramount to profit generated by the industries they are working for but the effects of psychosocial work and ergonomic risk factors on workers is increasing at an alarming rate which if not properly attended will lead to low productivity by the industries especially construction industries and high expenditure on medical bill for workers.

Construction is a physically demanding occupation which needs high skills workers and non-skilled workers whose safety is not paramount to their lives due to ignorance but they are vital part of nations 'economic productivity. These workforce handled tasks that range from carrying heavy loads to performing repetitive tasks, placing them at risk of high injuries. Jane and Gokul (2019)' explained that the physically demanding nature of the work helps to explain why injuries, such as strains, sprains, and work-related musculoskeletal disorders, are so prevalent and is the most common injury resulting in days away from work. Stephen, (2019) pointed out that people who develop CTD often experience pain and injuries, and in some cases may require surgery. Atinder and Annabella (2019), pointed out some potential indicators or symptoms of CTD as: trends in accidents and injuries; absenteeism; high turnover rate; working conditions noted by people with disabilities; complaints about musculoskeletal pain; poor products quality; manual/ materials handling and repetitive motion tasks; high over time and increased work rate. The effect of CTD is increasing at an alarming rate on construction workers where Brenner and Alern, (2000) identified tsome as negative valence, lack of controllability and suddenness. Workers' stress usually developed due to over work with an aim of achieving the goal of finishing the work within the target completion period of work in construction industries, and as a result, workers are over stressed because of the increase of speed of work and excessive actions of their body system. Trauma on construction workers include re-experiencing and avoidance symptoms across cognitive, effective and behavioral and psychological modes of experience. In response to this problem the study intends to explore the options for making the construction industries more ergonomically feasible by trying to identify psychosocial work and ergonomic risk factors effects through successfully implementing safety and health programs to address these issues of workers' stress and CTD including psychosocial work at construction sites.

Statement of the problem

Psychosocial work and ergonomic risk factors and their effects is an important point of concern on workers' stress and cumulative trauma disorder (CTD) at construction sites. The working environment is increasingly being regarded as a set of interdependent factors making up a complex whole which acts on people at work. These factors affect the psychological climate in the work place and the physical and mental health of workers. Workers that are frequently required to undertake heavy lifting, often with a bent or twisted posture, and biomechanical investigations are expected to generate high spinal stress. This work recognizes the absence or fewer results with direct linkage between psychosocial work and ergonomic risk factors and their effects on workers' stress and CTD. Therefore, it serves as a point towards addressing the problem of workers' agitation and damages claimed within the period of service or after retirement. Workers' stress usually developed due to over work with an aim of achieving the goal of finishing the work within the target completion period of work in construction industries, and as a result they are over-stressed because of the increase of speed of work and excessive actions by their body system.

Purpose of the study

The main purpose of this study was to examine the effects of psychosocial work and ergonomic risk factors on workers' stress and cumulative trauma disorders (CTD) at construction sites in North-East, Nigeria. Specifically; the study sought to:

1. Identify the effects of psychosocial work on construction workers' level of stress at construction sites in the North-East, Nigeria.
2. Identify the common ergonomic risk factors on workers' level of stress at construction sites in the North-East, Nigeria.

Research questions

1. What are the effects of psychosocial work on construction workers' level of stress at construction sites in North-East, Nigeria?
2. What are the common ergonomic risk factors on construction workers' level of stress at construction sites in the the North-East, Nigeria?

Methodology

The design for this study was a descriptive survey research design. This study was carried out in North-East geo-political zone of Nigeria which consists of 6 states, namely: Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe state respectively. The region lied between latitudes 6°26" and 7° 12" E, and longitudes 17°22" and 20°32" N on the globe and it covers a landmass of an area 104,639 square km. (Essien, 2004). Two research questions were formulated to guide the study. The population of this study comprises of all the construction workers in these six states engaged in active site works between the months of January to June 2021. Purposive random sampling was employed to arrive a sample of forty (40) construction workers comprising of both skilled and unskilled that normally undergo jobs that are liable to cause cumulative trauma disorders and are not ergonomic risk free. A 30-items structured questionnaire developed by the researchers was used for data collection. The items were based on a five point rating scale Strongly Agreed (SA), Agreed (A), Undecided (UD), Disagreed (D), Strongly Disagreed (SD) with values of 5,4, 3, 2, and 1 respectively. The instrument was validated by three experts and a reliability of 0.71 was obtained using Cronbach Alpha reliability method. Mean and standard deviation was used to answer the research questions. A total of 140 copies of the instrument were distributed to the respondents directly by the researchers with the help of two research assistants. Mean and Standard Deviation were used to answer the research questions. The decision reule considered any item with Mean greater than or equal to 3.50 as Agreed, otherwise Disagreed. The data were analyzed with the aid of Statistical Package for Social Science (SPSS) and Microsoft Excel software.

Results

Table 1: Mean and Standard Deviation of the Respondents' Responses on the Effects of Psychosocial Work on Construction Workers' Level of Stress at Construction Sites in the North-East, Nigeria

S/N	Items	Mean	SD	Remarks
1.	Improved relation between work environment and content	2.96	0.76	Agreed
2.	Act as health maintaining and health enhancing agents	3.50	0.85	Agreed
3.	Negative interaction between occupational conditions and human factors may lead to emotional issues	3.36	0.75	Agreed
4.	Positive influence, particularly as it relates to health	3.72	0.63	Agreed
5.	It has significant effect on workers' stress	3.82	0.66	Agreed
6.	It is not a health enhancing agent	1.24	2.85	Disagreed
7.	it is highly linked with workers' health and stress	3.55	0.46	Agreed
8.	Living environments can result to stressful experiences	3.66	0.63	Agreed
9.	Higher percentage of workers' disorders is mostly found at construction site	3.45	0.55	Agreed
10.	Construction industry workers with physical strains are usually absent from work	3.55	0.46	Agreed

From Table 1, the findings of the study revealed that almost all the respondents agreed with the statement that psychosocial work on has a tremendous effects on construction workers in construction industry at construction sites in North-East, Nigeria, only in item number seven of the table one posit negatively that Psychosocial work is not a health enhancing agent, with a mean rating of 1.24 and a standard deviation of 2.85 that yielded the result as "Disagree".

Table 2: Mean and Standard Deviation of the Respondents' Responses on Common Ergonomic Risk Factors on Construction Workers' Level of Stress at Construction Sites in the North-East, Nigeria

S/N	Items	Mean	SD	Remarks
1.	Ensures comfortable movement for people and products to perform work efficiently	3.70	0.71	Agreed
2.	Workers received less attention at construction site	2.45	0.63	Disagreed
3.	Poor ergonomics leads to increasing number of injuries caused by repetitive motions and excessive forces	3.83	0.68	Agreed
4.	Ergonomics and human factors are often used interchangeably at construction site	3.68	0.34	Agreed
5.	There is an interaction between workers and the job demand in ergonomics environment	3.55	0.67	Agreed
6.	Ergonomics focuses only on how workers were affected in work site	3.12	0.88	Agreed
7.	A good example of workers' ergonomics free environment is where workers experiences free slipping and tripping	3.72	0.61	Agreed
8.	Ergonomics risk causes body part to felt much discomfort	3.49	0.27	Agreed
9.	High demand will explore issues like workload, work pattern and cumulative trauma disorders	3.48	0.46	Agreed
10.	General body pain is an example of ergonomic risk	3.89	0.36	Agreed

Table 2 presents the result of opinion of the mean response of respondents on the common ergonomic risk factors on workers' stress at construction sites, where all the respondents agreed with the statement. While item seven of the table opined that workers received less attention at construction site but the statement was rejected with a mean of 0.63 with a standard deviation of 3.45 which shows the state of disagreement on the statement.

Conclusion

Based on the findings of the study, the data revealed that psychosocial work has tremendous effects on construction workers at construction sites in North-East, Nigeria. The study identified common ergonomics risk on workers at construction sites in the study area. Hence, there is need for redesigning some activities in construction industries to suit the workers for the benefit of their health.

Recommendations:

1. Activities should be performed at a suitable height to avoid an awkward postures in a workplace
2. Ergonomic risk free environment should be maintained for the safety of workers and tools/ equipment.
3. Psychosocial work factors should be identified in the construction industries.

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where it has identified the major problems prevailing among workers in construction industries nowadays is high prevalence of psychosocial work and ergonomic risk factors. Some various definitions of ergonomic were made and Psychosocial factors was defined as social and environmental influences that affect an individual's or group's mental health and behavior and it may include social situations, relationships between health care and other resources, and further classified psychosocial factors in to positive and negative.

Conceptual /theoretical Framework of the study; effects of psychosocial work on construction workers in construction industry; symptoms of cumulative trauma disorder (CTDs) on construction workers in construction industry; ergonomic risk factors and their effects on workers' stress in construction industry and management strategy for ergonomic risk factors on workers' stress in construction industry. The study concluded that the data revealed that

. However, the study also concluded that all the items in table two are the common ergonomics risk on workers in construction industry in the study area. Based o the findings of the study, the study recommended that: there is need for redesigning Finally it recommended that psychosocial work factors should be identified in the construction industries.

It further showed that adverse occupational psychosocial factors, however, have become increasingly significant, they have been defined as those psychological and social characteristics of the work environment which pose a threat to the individual. A review of studies on occupational stressors and related psychological, physiological and behavioral disorders reveals that serious problems are found in roughly 5-10 per cent of the working population, being higher among the older

The tradesmen involve for this study will includes: carpenters, iron binders, bricklayers/block layers and concreters.

age groups.

INNOVATIVE CONTENTS DELIVERY FOR TECHNICAL VOCATIONAL EDUCATION AND TRAINING PROGRAMMES IN THE ERA OF COVID-19 PANDEMIC

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Abstract: *COVID-19 pandemic has affected millions of people worldwide both directly and indirectly, claimed lives in many parts of the world, disrupted learning and training in al institutions and other learning centers and resulted into total lockdown. COVID-19 has threatened the world economy and pushed many on the brink of recession including Nigeria. Similarly the pandemic also made individuals, communities, governments, businesses and education and communities to think out of the box as the conventional face-to-face or sitting arrangement and practice and workshop activities became impossible considering the pandemic protocols. This warrants emergency innovative strategies and approaches to overcome the crisis or to subside the rate of spread of the infection. The paper highlights the challenges faced by TVET during the pandemic and how nations responded to the situation. Subsequently, the paper recommended innovative strategies and approaches to use in delivering TVET programmes as devised by others so that no learner is left out including enhancing remote learning, making institutions internet friendly for both teachers and students and capacity building capacity on information and communication technology.*

Keywords: *COVID-19, TVET programmes, Contents Delivery, Remote Learning, Capacity Building*

Introduction

Cities around the globe are affected by the outbreak of COVID-19 (Coronavirus), risking not only the public health, but also endangering the national and global economy and the fabric of societies. The Covid-19 pandemic and the resulting government actions to lock down large parts of society have led to the wide-spread closure of education premises for long periods (British Council, 2021). Because of COVID-19, many national and local governments around the world are currently confronting weak and strained financial resources. It forces authorities worldwide to implement a series of actions aiming at reducing its impacts, including lockdowns, travel restrictions, facility closures, distance learning, working from home and workplace hazard controls. Similarly, Mares, Cojocarius and Cîrțiță-Buzoianu, (2021) observed that "the current global context is fundamentally marked by the COVID-19 crisis which has generated a profound impact on all areas: economic, social, political, educational, health, free time, community life. As a result, it creates the worst economic contraction in decades, including hundreds of thousands of job losses (Ibrahim, 2020). On this basis German Office for International Cooperation in Vocational Education and Training (2021) opined that:

> "The pandemic makes it necessary for every individual country to develop solutions in accordance with its own specific situation and the means available to it. At the same time, a global crisis gives rise to mutual dependencies, making it necessary to compare and share strategies to overcome the crisis, and make a joint effort to implement these strategies" (pp. 1).

Following these challenges, the postponement of practical training phase deficit in the areas of didactics and methods are impending learning and teaching. Education is most affected due the fact academic calendar was disrupted and even after reopening of schools, COVID-19 protocols hindered practical and other activities are equally not possible. Organization for Economic Cooperation and Development (2020, p.1) observed that

> "if the lockdown continues over a long period of time, wholesale closures of education and training institutions may force learning providers to adopt system and technology innovations that will expand the use of distance learning and distance or alternative assessments".

Impact of COVID-19 pandemic on education

The pandemic led to the restriction of public gathering which consequently ended with lockdown including institutions. United Nations (2020) reported that "the COVID-19 pandemic has caused the largest disruption of education in history, having already had a near universal impact on learners and teachers around the world, from pre-primary to secondary schools, technical vocational education and training (TVET) institutions, universities, adult learning, and skills development establishments. Technically, the report concluded that

> "Technical vocational education and training systems are being uniquely impacted, not only in relation to how they provide TVET in the context of current social distancing and travel restrictions, but also in terms of how they are being forced to anticipate and adapt to what could very well be a significantly changed labour market in the coming months and years" (pp. 1).

The greatest risks facing education today is the strategies to leave no learner behind. It will provide a space for policy dialogue to examine the most pressing current challenges, informed by the presentation of some key data sets. In post-COVID-19 societies, as young people seek employment and are called upon to contribute to the recovery effort, they will need to be equipped with the relevant skills for today as well as the competencies to successfully manage evolving challenges and adapt to future disruptions. The crisis caused by the pandemic made governments, unions, parents and children grappling with when and how to approach the next phase lack of resources or enabling environment to access learning. It is true for the teaching profession and their need for better training.

Challenges on TVET in COVID-19 pandemic

The effect of COVID-19 is multidimensional affected all sectors including education. Hayashi *et al* (in Asian Development Bank, 2021) reported that:

> "Coronavirus disease (COVID-19) pandemic has posed significant challenges to education and employment, including TVET". The tradition of attending class or conducting practical in the workshop were disrupted. TVET instructors and students do not always have access to the internet and hardware devices for online training. Second, practical hands-on training is very difficult to provide online" (pp. 1).

On similar ground the ILO, UNESCO and WBG (2020, p.1) reported thus

> "As result of the TVET center closure, many respondents indicated disruptions in the provision of training.… trainers lack the skills necessary for remote training, and have low access to internet,… current situation is likely to lead to increased drop-out rates as some students become demotivated. Low internet access and lack of equipment among poor students as key impediments for remote learning…..and prevents students from carrying out practical training, a critical aspect for TVET"

Governments are increasingly concerned with assuring the quality of public services. At present, deficits in the areas of infrastructure, didactics and methods are impeding a direct transition to online learning and teaching. Challenges are posed by the postponement of practical training phases and the need to hold examinations online (GOVET, 2021). However, the crisis is also a good time to search for promising new solutions and ideas for future development. Advanced nations are not finding online learning strategy very new due to their advancement in communication technology and effective internet system and steady and constant power supply. The story is not different to some few third world countries as online contents are important in mitigating the risk of COVID-19 transmission, and TVET has facilitated the open access to e-resources during the pandemic (Hayashi *et al*. in Asian Development Bank, 2021). However, the Organization for Economic Cooperation and Development (2020) observed that while theory can be taught and learned online, practical aspects cannot be effectively delivered because of a lack of access to tools, materials, equipment and machinery.

Nevertheless, the crisis has shone light on the lack of adequate technological infrastructure, digital skills and pedagogical resources, and the negative consequences that this can have in the short and longer term, in particular for the most disadvantaged population groups (ILO, UNESCO & WB, 2021). Based on this observation, they opine that "given the severe disruption, it was of crucial importance to identify adequate, quick, practical and innovative solutions to respond to this crisis. The expectation that TVET could continue during the pandemic was high, vulnerabilities including low levels of digitalization and long-standing structural weaknesses, have been brought to light by the crisis. Disruptions in work places made it difficult to implement apprenticeship schemes and work-based learning modes (United Nations, 2020). Similarlt, a joint survey by ILO, UNESCO and WBG in 2020 showed that the proportion of respondents who did not use distance learning at all is particularly high in Africa, and Arab States in comparison to other regions. It is estimated that the share of upper secondary level TVET students is 15% in low-income countries, compared to 21% and 28% in middle- and high income countries, respectively (UNESCO, 2020a, 2020b). While global data does not exist, in many countries, TVET students come from disadvantaged households compared to pupils in similar levels of general education. This would imply that TVET students are likely to struggle more than their peers in general education with the connectivity that is essential for remote learning and with managing without any social support that is usually provided through schools.

The pandemic has unprecedented challenges to all types and levels of learners. Hence, developing job related competencies among the youth is recognized as critical to progress in solving youth unemployment and economic development. Technical and vocational education is the door to economic and socially uplift and help the development of small informal sectors business that could cater for youth unemployment and lead to economic development of a nation. Akor *et al* (2016) posit that "today awareness has been rekindled among policy makers in Africa and international arenas on the developmental role technical and vocational education can play in any nation's economy. Despite the 2030 Sustainable Development Goals promise on education in general and TVET in particular, nations like Nigeria Oketch in Akor *et al* (2016) observed that:

> "Given recent development in which knowledge and skills have become more acceptable terms in economically more developed nations, in which both are seen to go hand in hand, what is happening in Nigeria is that development is highly sought but has proven to be elusive. This has brought back to the forefront one of the dilemmas which has pre-occupied Nigeria for a long time whether to concentrate investment in general education or in technical and vocational education"

This situation observed above continue to impede realistic budget allocation to TVET. Wolf in Akor *et al* (2016) opined that that in order for a country to achieve her development aspiration the youth need to have access to education that will enable them to enhance their standard of living and gain competitive skills that will be in high demand in the labour market. The dream and hope posed on TVET as reliable avenue to youth unemployment has been shattered by covid-19 pandemic, because practical serving as core component to the programme cannot hold due to distancing protocol.

TVET during Pandemic period: Way Forward

The crisis has shone light on the lack of adequate technological infrastructure, digital skills and pedagogical resources, and the negative consequences that this can have in the short and longer term, in particular for the most disadvantaged population groups. To this extent, the Commonwealth of Learning (2020) established a network called Flexible and Blended Technical Vocational Education and Training Network (FaB TVET Network) an online space for groups of TVET practitioners to meet and learn together. This is useful for serving a wide and diverse range of students and achieving a competitive advantage for training organizations and employers by delivering training in international, national, regional and remote areas in forms and ways that best suit the learners' styles, needs, work schedules and circumstances (UNESCO and CoL, 2017).

The world responded quickly to education sector to avoid further damages particularly TVET were most training involving practical or face-to-face activities could not take place. New pedagogical innovations are on high demand. Digital instructions are designed to keep learning uninterrupted. In this situation Nigeria must realized the importance of developing and sustaining online teaching as a methodology in itself and in covid-19 pandemic era. Nigeria must see the pandemic as a platform in many respects. The issue of postmodernism and post-postmodernism is fascinating for researchers, constantly revealing new inter and transdisciplinary aspects (such as the COVID-19 pandemic), which makes it of great theoretical and practical interest, open to multiple approaches and transposable to the full dimension of the global society (Mares, Cojocarius & Cîrțiță-Buzoianu, 2021). World Bank (2020) reported that since most educational institutions, including those in TVET, have closed due to COVID-19 measures, teaching and learning has moved from classrooms to remote means, facilitated by the internet, television, radio, or print materials. According to Asian Development Bank (2021), crisis caused by the pandemic as an opportunity and itemised points as seven dividends of the pandemic, thus:

1. Greater emphasis on educating the whole child (socio-emotional development)
2. Greater appreciation of science and technology
3. Greater appreciation of and use of technology
4. Greater communication schools-homes
5. Greater societal appreciation of education
6. Greater collaboration among teachers and other stakeholders
7. Greater reliance on partnerships

Conclusion

The COVID-19 pandemic has serious negative impact on the future of the coming generation and future forecast is yet to establish when the situation will improve taking into mind nature of the pandemic coming in phases with latter more severe than former. Education has virtually standstill and is two steps backward due to the pandemic protocols. The option of remote learning or online lesson as a result of lockdown is not all that effective due to unavailability of internet service and computers/laptops, families with disadvantaged socioeconomic backgrounds, learners with special needs are at high risk of falling even further behind and at high risk of violence, drug abuse, and neglect and to sum it all rise in unemployment among the youth who are at the brick social restiveness. These and many are the consequences of lockdown and remaining out of school.

Recommendations

1. TVET educational planning should include a pandemic protocol, i.e. distant learning in TVET plan should be innovated as to continue TVET even in a locked down including giving room for practical activities which cover 70% of the programme.
2. Transforming TVET for sustainable development should be the central agenda for the future as workforce is highly affected due to shutdown of training centers because of the pandemic.
3. Massive awareness rising is needed to emphasize hygiene measures and the healthy practices among all stakeholders.
4. Teachers' capacity on developing online education stuff, ethical and moral values and global citizenship be strengthened.
5. Students should be provided with the learner-centered and self-autonomous tools to learn on their own with remote teacher guide, consultation, assessment and evaluation.
6. As opportunity dictates, TVET institutions can be leading examples to implement greening approaches teaching and learning activities practical wise.

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COMPETENCY NEEDS IMPROVEMENT FOR EFFECTIVE CONTENT DELIVERY IN THE ERA OF COVID-19 PANDEMIC AMONG OF ELECTRICAL/ELECTRONICS LECTURERS IN COLLEGES OF EDUCATION IN NORTH-EASTERN NIGERIA

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Abstract: *This study sought to study lecturers' competency needs in teaching electrical/electronics curriculum content in the era of COVID-19 in order to curb the challenges associated with the development and deployment of TVET in the Era of the pandemic. Two research questions and two hypotheses guided the study which adopted descriptive survey research design. The population of the study was 62 comprising 49 lecturers and 13 Technologist in Federal Colleges of Education (Technical) in North-East, Nigeria. The entire population was used hence, there was no sampling. A structured Questionnaire developed by the researcher titled: Questionnaire for Lecturers' Competency Needs in Teaching Electrical/Electronics Curriculum Content in the Era of Covid-19 Pandemic (QTCNTECCEC-19) was used as instrument for Data Collection. The instrument was validated by three experts and a reliability of 0.87 was obtained using Cronbach Alpha reliability method. Mean statistic was used to answer the two research questions while t-test was used to test the two null hypotheses at 0.05 level of significance. Findings of the study revealed among others that in the area of COVID-19, lecturers need improvement in the following teaching strategies: Learning Management System (LMS), Computer Managed Learning (CML), Computer Assisted Instruction (CAI), Synchronous and Asynchronous Online Learning, Fixed, Adaptive, Linear, Interactive, Individual and Collaborative Online Teaching Strategies. It was also revealed that lecturers need skill improvement in the use of interactive board, power-point presentations, online applications among others. Based on the findings, the Colleges management should ensure that the ICT unit domicile in their institutions organize training workshop for lecturers on the various e-teaching applications. National Commission for Colleges of Education (NCCE) should ensure that lecturers are given refresher courses regularly to update their skills in ICT facility utilization.*

Keywords*: Competency Needs, Curriculum Content, COVID-19 Pandemic, Technical Education*

Introduction

As the COVID-19 pandemic ravages the world, it is essential to attend to the educational needs of learners during the crisis. COVID-19 pandemic is a matter of Public Health, and mitigating its impact will depend greatly on the actions of scientists and pharmaceutical manufacturers in discovering a vaccine or other pharmaceuticals to prevent or treat COVID-19 infections, and of finding approaches to delivering such medicines on a broad scale. According to Kaur, Dwivedi, Arora and Gandhi (2020), the effective pharmaceutical interventions mitigating the impact of the pandemic will depend on the actions of public health and government officials in slowing down the spread of infection, through non-pharmaceutical measures such as social distancing. According to Rapanta, Botturi, Goodyear, Guàrdia and Koole (2020), the large-scale non-pharmaceutical interventions of the COVID-19 pandemic vary between countries but include social distancing (such as banning large gatherings and advising individuals not to socialize outside their households), border closures, school closures, measures to isolate symptomatic individuals and their contacts, and large- scale lockdowns of populations with all but essential internal travel banned. The restrictions caused by non-pharmaceutical interventions like social distancing have also affected education at all levels, and will continue to do so for at least several months (if not years), as learners and lecturers would be unable to physically meet. These limitations in the ability to meet during a protracted pandemic will limit opportunities for students to learn. It is well known that time spent learning, or learning time, is one of the most reliable predictors of opportunity for students to learn. According to Zalat, Hamed and Bolbol (2021), extended interruption of one's studies causes not only a suspension of learning time, but causes a loss of knowledge and skills gained. This disruption will affect the livelihoods of individuals, their educational pursuit and the prospects of their communities.

It is imperative, for this reason, that electrical/electronics lecturers take immediate steps to develop and implement strategies which mitigate the educational impact of the pandemic; adopt a proactive approach in imparting knowledge to the learners and to prevent learning loss during the period of necessary social distancing. It is expected that electrical/electronics lecturers would also contribute to the creation of opportunities to help re-skill those displaced by the pandemic and facilitate their re-integration into the labor market. The ravaging COVID-19 pandemic which creates gap between the lecturers and the students, between students and the learning environment through social distancing can be bridged by the use of Information and Communications Technologies (ICTs) skill competencies if acquired by the lecturers. According to Hattie and Yates (2013), ICT tools and devices; and the Internet hold the promise of enhancing the (traditional) learning experiences of students, and perhaps of acting as a catalyst for wider change, where such change is desired. According to Barrera-Osorio and Linden (2009), the widespread presence of ICT in society, used for everyday work and leisure activities, and the increasing number of goods and services whose production relies on ICT, create a demand for digital competencies, which are, arguably, best learned in context. While learning with and about ICT may well take place outside of school, initial education can play a key role in ensuring that everyone can use these technologies and benefit from them, bridging the divide between rich and poor (Falck, Mang & Woessmann, 2015). Finally, where lecturer shortages exist or can be expected, ICT may complement other actions taken to attract and retain lecturers in the profession.

Computers and the internet are increasingly part of the environment (OECD, 2016) in which electrical/electronics lecturers in Federal Colleges of Education (Technical) teach and learn in North-East, Nigeria. Schools and education systems therefore need to reap the educational benefits of ICT. They help schools and lecturers to keep abreast of the constant flow of technological novelty, and to manage the change and disruption that new tools may introduce. ICT can support and enhance learning (Beuermann, Cristia, Cueto, Malamud & Cruz-Aguayo, 2015). With access to computers and the internet, lecturers can search for information and acquire knowledge beyond what is available through textbooks. ICT also provide lecturers with new ways to practice their skills – such as maintaining a personal webpage or online publication, programming computers, talking and listening to native speakers when learning a second language, and/or preparing a multimedia presentation, whether alone or as part of a remotely connected team (Barrera-Osorio & Linden, 2009). ICT devices bring together traditionally separated education media (books, writing, audio recordings, video recordings, databases, games, etc.), thus extending or integrating the range of time and places where learning can take place (Livingstone, 2011). The widespread presence of ICT in everyday lives also creates a need for specific skills. At the very least, education can raise awareness within lecturers about the risks that they face and how to avoid them (OECD, 2012). As a dynamic and changing technology that requires its users to update their knowledge and skills frequently, ICT also invites the lecturers to rethink the content and methods of teaching and learning. According to Avvisati, Hennessy, Kozma and vincent-Lancrin (2013), users of ICT as we all are today – often have to adjust to a new device or software or to new functions of their existing devices and applications.

Competency is a combination of skills and knowledge needed to perform a specific task in a given context (Jones, Voorhees & Paulson, 2002). Marija and Palmira (2007) also described competency as ability to do something well, measured against a standard especially ability acquired through experience or training. Competency involves skills and attitudes that are observable, measurable and necessary to perform a job independently at a prescribed proficiency level (Sefyrin, 2005). To be competent means to possess adequate skills in order to carry out something to an acceptable standard. In other words, a competent Electrical/Electronics lecturer should possess the skill and knowledge required to effectively teach Electrical/Electronics technology in order to fit into the world of work after the program. The competencies needed by the lecturers in this new era of COVID-19 pandemic must be one that bridges the gap created by the pandemic. These competencies are virtually domiciled in the Information and Communications Technology (ICT) which is majorly the use of computer and internet.

According to Moses, Ezugu, Amos and Usman (2019), curriculum is a general overall plan of the content that the school should offer to a student by way of qualifying them for certification and entrance to a profession. While contents refer to the subject matter or topics consisting of facts and how they will bring about change in the individual and to the society (L'kama, 2013). The Nigerian Certificate in Education, Nigeria Business and Technical Education Curricula were all developed in line with the pre-vocational curricula developed by the Federal Ministry of Education in association with the former Comparative Education Study and Adaptation Centre (Falck, *et al.*, 2015). According to the National Commission for Colleges of Education (2012), the contents for National Certificate of Education in electrical/electronics include: Introduction to Electrical/ Electronics, Auto Electrical System, Digital Electronics and Telecommunication. While students Industrial Work Experience Scheme (SIWES) is to provide students with industrial experience, operation and the use of machinery, knowledge of the management structures of industrial organization and to develop good work habit. Necessary skills in emerging technologies and modern electrical/electronic systems are paramount in keeping lecturers and graduates within the workforce updated (Ezugu, Moses, Amos & Usman, 2019). The advent of COVID-19 pandemic had made the achievement of the objectives of the electrical/electronics curriculum in Colleges of Education difficult as the pandemic have created a disruption in the school calendar and as such demands new competencies on the part of the lecturers to achieved the aims and objective of the program. This concern therefore necessitated the focus of this study

Statement of the problem

It is evident that Nigeria and the world cannot return to its previous state before the ravaging pandemic. Already, the disruptions brought on by the pandemic are exacerbating inequalities both within and across countries. There is an urgent need to invest and structure changes so that short-term setbacks do not grow into larger, long-lasting problems. There is a serious risk that COVID-19 will wipe out several decades of progress—most notably the progress that has been made in addressing problem of teaching and learning in Colleges of Education in Nigeria. In order to navigate through the COVID-19 pandemic and keep abreast with the challenges that come with it on the process of teaching and learning, lecturers in the Federal Colleges of Education (Technical) in North-East, Nigeria must demonstrate competencies that will enable them continue with the teaching and learning of electrical/electronics in the face of the pandemic. It is against this backdrop that the study was undertaken.

Purpose of the Study

The purpose of this study was to determine lecturer's competency needs in teaching electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in the North-East, Nigeria. Specifically, the study sought to determine:

1. The e-teaching strategies needed for effective teaching of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria
2. The lecturers' information and communication technology (ICT) skills needed for effective teaching of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria

Research questions

1. What are the e-teaching strategies needed for effective teaching of electrical/electronics curriculum Content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria?
2. What are the lecturers' information and communication technology (ICT) skills needed for effective teaching of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria?

Hypotheses

H_{O1}: There is no significant difference between the mean response of lecturers ICT experts on the e-teaching strategies needed for effective teaching of electrical/electronics curriculum Content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria.

H_{O2}: There is no significant difference between the mean response of lecturers and ICT experts on the ICT skills needed for effective teaching of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria.

Methodology

The study adopted a descriptive survey research design and was conducted in North-East geopolitical zone of Nigeria. The zone comprises of Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe States. The population of the study was 164 which comprised of 42 lecturers of electrical/electronic from Federal Colleges of Education (Technical) and 122 ICT experts in the 27 ICT establishments North East, Nigeria. Due to the manageable size of the population, there was no sampling, hence, the whole population was used for the study. The instrument used for data collection was a structured questionnaire developed by the researchers titled: "COVID-19 Pandemic Lecturers' Competency Needs Questionnaire (COVID-19 PLCNQ)". The responses on the questionnaire were structured on a 5-point Rating scale of Highly Needed (HN) = 5, Needed (N) = 4, Moderately Needed (MN) = 3, Slightly Needed (SN) = 2, and Not Needed (NN) = 1. The questionnaire was validated by three experts from the Department of Electrical Technology Education, Modibbo Adama University, Yola, Adamawa State. A reliability co-efficient of 0.78 was obtained for the instrument using Cronbach Alpha reliability method after conducting a trial test of the instrument on six lecturers in Federal College of Education (Technical), Pankshin and 10 ICT experts six ICT firms in Jos all in Plateau State. Data for the study was collected by the researchers with help of two research assistants. Mean statistic was used to answer the two research questions of the study while t-test was used to test the null hypotheses of the study. All items with mean score of 3.50 and above were considered "Needed" and all items with less than 3.50 were considered "Not needed". In deciding for the hypothesis, were the p-value is greater that the α-value, the null hypothesis was considered "Significant" and if otherwise "Not Significant".

Results

Table 1: Mean and Standard Deviation of Respondents' Responses on the E-teaching Strategies Needed For Effective Teaching

S/N	Items	Respondents						
		$N_l = 42$		$N_{ICT} = 122$		$N_T = 164$		
		$\bar{x}_l$	σ_l	$\bar{x}_{ICT}$	σ_{ICT}	$\bar{x}_G$	σ	RMK
1.	Ability to use Learning Management System (LMS)	3.98	0.78	4.08	0.64	4.05	0.68	Needed
2.	Ability to use Computer Managed Learning (CML)	3.98	0.87	3.94	0.50	3.95	0.61	Needed
3.	Ability to use Computer Assisted Instruction (CAI)	4.40	0.50	4.32	0.75	4.34	0.70	Needed
4.	Ability to utilize synchronous learning platforms	4.07	0.71	4.07	0.62	4.07	0.64	Needed
5.	Ability to utilize asynchronous learning platforms	4.00	0.80	3.87	1.14	3.90	1.06	Needed

S/N	Items	Respondents						
		N_l = 42		N_{ICT} = 122		N_T = 164		
		$\bar{x}_l$	σ_l	$\bar{x}_{ICT}$	σ_{ICT}	$\bar{x}_G$	σ	RMK
6.	Ability to use adaptive teaching strategies	4.52	0.51	4.42	0.64	4.45	0.61	Needed
7.	Ability to use linear teaching strategies	4.38	0.49	3.98	0.61	4.08	0.61	Needed
8.	Ability to use interactive teaching strategies	4.07	0.71	3.95	0.76	3.98	0.75	Needed
9.	Ability to use individualized teaching strategies	4.29	0.64	3.99	0.55	4.07	0.59	Needed
10.	Ability to use online collaborative teaching strategies	4.26	0.91	3.75	0.61	3.88	0.73	Needed
	Group Mean	**4.20**		**4.04**		**4.08**		**Needed**

Where: $\bar{x}_l$ = Mean of Lecturers $\bar{x}_{ICT}$ = Mean of ICT Experts, σ_l = Standard deviation of Lecturers, σ_{ICT} = Standard deviation of ICT Experts, $\bar{x}_G$ = Grand Mean, σ = Standard deviation, N_l = Number of Lecturers, N_{ICT} = Number of ICT Experts, N_T = Total Number of Respondents, *RMK* = Remark

The data presented in Table 1 shows that all item had their means above the cutoff point of 3.50 with the group mean weight of 4.20 and 4.04 for both lectures and ICT experts. The overall group mean of 4.08 implies that the e-teaching strategies listed in item 1 - 10 are needed by lecturers for effective teaching. of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria

Table 2: Mean and Standard Deviation of Respondents' Responses on ICT Skills Needed for Effective Teaching

S/N	ITEMS	Respondents						
		N_l = 42		N_{ICT} = 122		N_T = 164		
		$\bar{x}_l$	σ_l	$\bar{x}_{ICT}$	σ_{ICT}	$\bar{x}_G$	σ	RMK
1.	Ability to create online group	4.38	0.49	4.35	1.08	4.36	0.96	Needed
2.	Ability to upload learning materials online	4.52	0.51	4.14	1.03	4.24	0.94	Needed
3.	Ability to share learning materials online	4.48	0.51	4.40	0.84	4.42	0.77	Needed
4.	Ability to use video chat in lesson delivery	4.36	0.62	4.25	0.84	4.27	0.79	Needed
5.	Ability to live-stream audio lessons	4.55	0.55	4.57	0.95	4.56	0.87	Needed
6.	Ability to live-stream video lesson	4.29	0.71	4.39	0.54	4.36	0.58	Needed
7.	Ability to live-stream presentations	4.38	0.54	3.76	0.80	3.92	0.79	Needed
8.	Ability to use live Virtual Classroom	4.29	0.60	3.98	0.57	4.05	0.59	Needed
9.	Ability to use LEARN's chat feature to engage in live conversations with Students	4.29	0.51	4.07	0.49	4.12	0.50	Needed
10.	Ability to use Google Docs to simultaneously edit documents	4.52	0.51	4.34	1.10	4.38	0.98	Needed
	Group Mean	**4.41**		**4.23**		**4.27**		**Needed**

Where: $\bar{x}_l$ = Mean of Lecturers $\bar{x}_{ICT}$ = Mean of ICT Experts, σ_l = Standard deviation of Lecturers, σ_{ICT} = Standard deviation of ICT Experts, $\bar{x}_G$ = Grand Mean, σ = Standard deviation, N_l = Number of Lecturers, N_{ICT} = Number of ICT Experts, N_T = Total Number of Respondents, *RMK* = Remark

The data presented in Table 2 shows that all item had their means above the cutoff point of 3.50 with the group mean weight of 4.41 and 4.23 for both lectures and ICT experts respectively. The overall group mean of 4.27 implies that the information and communication technology (ICT) skills listed in item 11 - 20 are needed by lecturers for effective teaching. of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria.

Table 3: t-test Statistical Analysis of the Difference between the Mean Responses of the Lecturers and ICT Experts Lecturers' on E-teaching Strategies Needed

S/N	Items	Respondent	N	$\bar{x}$	σ	df	t	p	RMK
1.	Ability to use Learning Management System (LMS)	Lecturers	42	3.98	0.78	162	-0.874	0.383	NS
		ICT Experts	122	4.08	0.64				
2.	Ability to use Computer Managed Learning (CML)	Lecturers	42	3.98	0.87	162	0.304	0.761	NS
		ICT Experts	122	3.94	0.50				
3.	Ability to use Computer Assisted Instruction (CAI)	Lecturers	42	4.40	0.50	162	0.683	0.496	NS
		ICT Experts	122	4.32	0.75				
4.	Ability to utilize synchronous learning platforms	Lecturers	42	4.07	0.71	162	-0.020	0.984	NS
		ICT Experts	122	4.07	0.62				
5.	Ability to utilize asynchronous learning platforms	Lecturers	42	4.00	0.80	162	0.692	0.490	NS
		ICT Experts	122	3.87	1.14				
6.	Ability to use adaptive teaching strategies	Lecturers	42	4.52	0.51	162	0.970	0.333	NS
		ICT Experts	122	4.42	0.64				
7.	Ability to use linear teaching strategies	Lecturers	42	4.38	0.49	162	3.896	0.000	S
		ICT Experts	122	3.98	0.61				
8.	Ability to use interactive teaching strategies	Lecturers	42	4.07	0.71	162	0.902	0.368	NS
		ICT Experts	122	3.95	0.76				
9.	Ability to use individualized teaching strategies	Lecturers	42	4.29	0.64	162	2.857	0.055	NS
		ICT Experts	122	3.99	0.55				
10.	Ability to use online collaborative teaching strategies	Lecturers	42	4.26	0.91	162	4.124	0.073	NS
		ICT Experts	122	3.75	0.61				

Where: P > 0.05 N= Number of respondents, S = Significant, NS = Not Significant, σ = Standard Deviation

The result presented in Table 3 sowed that nine out of 10 e-teaching strategies had their p-values which ranges between 0.073 and 0.984 which is greater than the α-value of 0.05 which indicated no significant difference in the mean responses of lecturers and ICT experts. Meanwhile, item 7 shows significant difference in the opinion of lecturers and ICT experts with p-value of 0.00 which is less than the α-value of 0.05. Therefore, the null hypothesis of no significant difference in the mean response of lecturers and Information and Communication Technology (ICT) experts on the e-teaching strategies needed for effective teaching of electrical/electronics curriculum Content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria was upheld.

Table 4: t-test Statistical Analysis of the Difference between the Mean Responses of the Lecturers and ICT Experts on ICT Skills Needed by the Lecturers

S/N	Items	Respondent	N	$\bar{x}$	σ	df	t	p	RMK
1.	Ability to create online group	Lecturers	42	4.38	0.49	162	0.165	0.869	NS
		ICT Experts	122	4.35	1.08				
2.	Ability to upload learning materials online to students	Lecturers	42	4.52	0.51	162	2.319	0.022	S
		ICT Experts	122	4.14	1.03				
3.	Ability to share learning materials online	Lecturers	42	4.48	0.51	162	0.542	0.589	NS
		ICT Experts	122	4.40	0.84				
4.	Ability to use video chat in lesson delivery	Lecturers	42	4.36	0.62	162	0.790	0.430	NS
		ICT Experts	122	4.25	0.84				
5.	Ability to use Web-application to live-stream audio lessons	Lecturers	42	4.55	0.55	162	-0.115	0.908	NS
		ICT Experts	122	4.57	0.95				
6.	Ability to use Web-application to live-stream video lesson	Lecturers	42	4.29	0.71	162	-0.951	0.343	NS
		ICT Experts	122	4.39	0.54				
7.	Ability to use Web-application to live-stream presentations within the lesson	Lecturers	42	4.38	0.54	162	4.639	0.000	S
		ICT Experts	122	3.76	0.80				
8.	Ability to use Bongo Virtual Classroom to hold live classes	Lecturers	42	4.29	0.60	162	3.018	0.003	S
		ICT Experts	122	3.98	0.57				
9.	Ability to use LEARN's chat feature to engage in live conversations WITH Students	Lecturers	42	4.29	0.51	162	2.475	0.014	S
		ICT Experts	122	4.07	0.49				
10.	Ability to use Google Docs to simultaneously edit documents	Lecturers	42	4.52	0.51	162	1.070	0.286	NS
		ICT Experts	122	4.34	1.10				

Where: P > 0.05 N= Number of respondents, S = Significant, NS = Not Significant, σ= Standard Deviation

The result presented in Table 4 sowed that six (11, 13, 14, 15, 16 and 20) out of 10 Information and Communication Technology skills had their p-values which ranges between 0.286 and 0.908 which is greater than the α-value of 0.05 which indicated no significant difference in the mean responses of lecturers and ICT experts. However, item 12, 17, 18 and 19 showed significant difference in the opinion of lecturers and ICT experts with p-value range of 0.000 and 0.022 which is less than the α-value of 0.05. Therefore, the null hypothesis of no significant difference in the mean response of lecturers and Information and Communication Technology (ICT) experts on the ICT skills needed for effective teaching of electrical/electronics curriculum Content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria was upheld.

Study findings

1. In the area of COVID-19, lecturers need improvement in the following e-teaching strategies: Learning Management System (LMS), Computer Managed Learning (CML), Computer Assisted Instruction (CAI), Synchronous and Asynchronous Online teaching; Adaptive, Linear, Interactive, Individual and online collaborative teaching strategies
2. In the area of COVID-19, lecturers need improvement in the following ICT skills: Ability to create online group upload learning materials online to students, share learning materials online, use video chat in lesson delivery, use web-application to live-stream audio lessons, use Bongo Virtual Classroom to hold live classes
3. There is no significant difference in the mean response of lecturers and Information And Communication Technology (ICT) experts on the e-teaching strategies needed for effective teaching of electrical/electronics curriculum Content in the era of Covid-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria.
4. There is no significant difference in the mean response of lecturers and Information And Communication Technology (ICT) experts on the lecturers' ICT skills needed for effective teaching of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria

Discussion of the findings

Findings of the study on research question 1 revealed that in the area of COVID-19, lecturers need improvement in the following e-teaching strategies: Learning Management System (LMS), Computer Managed Learning (CML), Computer Assisted Instruction (CAI), Synchronous and Asynchronous Online teaching; Adaptive, Linear, Interactive, Individual and online collaborative teaching strategies. The finding is in agreement with Avvisati, *et al.,* (2013) who in their submission asserted that schools are rapidly moving from analogue to digital. The authors proposed that in order for schools to be fully integrated into the digitation, teacher must acquire certain skills that will enable them to fit into the digital world. With the continued presence of the pandemic, school will from time to time remain close and as such Muftahu (2020) retorted that in order to sustain educational goals, teaching and learning processes must migrate rapidly to information and communication technology arena.

Findings of the study on research question 2 revealed that in the area of COVID-19, lecturers need improvement in the following ICT skills: Ability to create online group upload learning materials online to students, share learning materials online, use video chat in lesson delivery, use web-application to live-stream audio lessons, use Bongo Virtual Classroom to hold live classes. The findings is in agreement with Hattie and Yates (2013) who reported that learning must be visible to the learner and as such the teacher must in all matters ensure that he brings the learning materials in a virtual environment to the understanding of the students by integrating ICT materials, gadgets and applications into the teaching process. Falck, *et al.,* (2015) reported that in a virtual environment, teachers must understand and acquire competencies that will enable them function effectively in such environment.

The finding with respect to null hypothesis one revealed that there is no significant difference in the mean response of lecturers and Information and Communication Technology (ICT) experts on the e-teaching strategies needed for effective teaching of electrical/electronics curriculum Content in the era of Covid-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria. The finding is in tandem with Owusu-Fordjour, Koomson and Hanson (2020) who reported the impact of Covid-19 on learning. The report highlighted that COVID-19 has created a huge gap that only technology can fill and in filling the gap, certain level of competencies are require by the teachers. In support of the finding, Sintema (2020) stressed that carefulness must be attached while selecting teaching strategies for teaching students in era of COVID-19 pandemic as the pandemic has an adverse effect on the students' academic performance.

Finding with respect to null hypothesis two revealed that there is no significant difference in the mean response of lecturers and Information and Communication Technology (ICT) experts on the lecturers' ICT skills needed for effective teaching of electrical/electronics curriculum content in the era of COVID-19 Pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria. The findings of the is in agreement with Owusu-Fordjour, *et al.,* (2020) who reported that there was significant difference between the mean achievement scores of student taught using ICT and those taught without ICT materials with those taught using ICT having a an edge over their opponent. To further buttress the finding, Mbiydzenyuy (2020) reported that teaching and learning in the face of COVID-19 pandemic is tedious and as such easy way of transferring knowledge to the learner must be sorted by the teacher and in return self-development and acquisition of competencies becomes inevitable.

Conclusion

E-learning was underutilized in the past, especially in developing countries. However, the current crisis of the COVID-19 pandemic enforced the entire world to rely on it for education. It is on this ground that improving lecturers' competency needs in teaching electrical/electronics curriculum content in the era of covid-19 pandemic in Federal Colleges of Education (Technical) in North-East, Nigeria becomes as a positive step towards evolution and change in teaching and learning.

Recommendations

1. The College management should ensure that the ICT unit domicile in the school organize training workshop for lecturers on the various e-teaching applications.
2. National Commission for Colleges of Education (NCCE) should ensure that lecturers are given refresher courses regularly to update their skills in ICT facility utilization.

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EMPLOYABILITY SKILLS AMONG FEMALE STUDENTS IN TERTIARY TECHNICAL AND VOCATIONAL EDUCATION INSTITUTIONS IN NORTH-EAST, NIGERIA

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Abstract:*The study seeks to understand the issues of gender Generic skills in pursuit of Employability Skills in Technical and Vocational Education (TVE). This, formed a significant part of general discussion in sub-saharan region of the North-East, Nigeria. The purpose of this research is to ascertain the generic skill element on employability skills possessed among the female students of tertiary institutions offering technical and vocational education. The total of 142 female student of NCE III final year from the chosen institutions as a sample representation of this research within the North-East States of the Nigeria. The respondents were drawn using Purposive sampling technique for the study. Five points scale items were designed to elicit information from the respondents. The data were collected and analyzed by using Mean and Standard Deviation to determine the responses of the respondents. Findings of the study revealed, among others, that the difference in employability skills possessed in colleges of education and Polytechnics female students was moderately high. Therefore, it was recommended that the TVE curriculum be reviewed to incorporate elements of employability skills needed by the employers of labour irrespective of gender.*

Keywords: *Gender, Emoloyability Skills Technical and Vocational Education*

Introduction

The fundamental requirement of all technical and vocational education programmes is the skills development and subsequent utilization of the acquired skills. Technical and Vocational Education explained by the United Nations Educational, Scientific and Cultural Organizations (2017) and International Labour Organisations (2018) as a means of preparing individuals for occupational fields for effective participation in the world of work; an aspect of lifelong learning and preparation for responsible citizenship; an instrument for promoting environmentally sound, sustainable development and a method of facilitating poverty alleviation. In demonstration of the commitment by Nigerian government towards ending the insurgency problem with in the North-East zone, technical and vocational education (TVE) in the Colleges of Education and Polytechnics, are one of the key factors for training strategies adopted in employability skills development to drive the nation economy towards achieving laudable strengthen of restructuring self-reliance vision. It's also has a significant role to play in the life of female gender as they make up more than half of the Nation's population in National Population Commission (2006) report respectively. The society is yet to appreciate fully the pivotal role of science and technology in socio-economic development of nation. Added to that; is myth of difficulty of vocational and technical subjects which still grips our students. The prevailing economic, social and political development in Nigeria demands proper utilization of our human resources. Human resources of any country – those who supply the economy with their skill and talents are important for meaningful development. For human resources to contribute effectively, it must receive the proper kind of education that prepare them well enough, and one which does not discriminate on the basis of gender. Babangida (1988), as cited in Mustapha and Gabasa (2013), warned an imminent male/female imbalance. Females should as a matter of right be given the opportunity to equip themselves to make useful contribution to the national development at the crucial time and in the decade to come. Female, should not only be allowed to read and write, but should also be technologically educated for the national development and be empowered to achieve the Sustainable Development Goals (SDGs). SDGs goals, these efforts led to the introduction of many policies and programmes for the development and division of education into different aspects like Science Education, Technical Education, and Vocational Education (Federal Republic of Nigeria, 2014). All these types of education were set up with defined objectives towards empowering the Nigerian populace.

Statement of the problem

Great emphasis by the government on the ways and means of providing effective technical and vocational education (TVE) to meet the needs of female students' gender employability skills, through knowledge and attitude for self-reliance. The rapid development of the current working world needs proficient workers mainly in fields which involved latest technologies. The number of workforce in North-East, Nigeria has low in terms of the proficient and non-proficient workforces produced by public and private training institutions. National Bureau of Statistics (2010) revealed, that 38.7million youths in Nigeria are unemployed while 70% of this number are graduates. The tertiary education institutions entrepreneurship skills acquisition training manuals requires content review to deliver gender inclusive strategic solutions to the growing level of youth unemployment (Kofarmata, 2019). Youth unemployment policy became a major macroeconomic policy target since, 2008 despite the declining employment opportunities since, 1983. Yet, in North-Eastern State of Borno, only 38% of eligible students are enrolled in school. So it is not surprising that 51.2% of Borno are currently unemployed or underemployed. A re-think is needed to provide broader access to vocational training, on 'soft' employability skills, as well as improved access to formal education, particularly for girls (Mercy Corps, 2018). This is the concern of the research.

Purpose of the study

The major purpose of this research is to determine the employability skills possessed by female students in tertiary institutions offering technical and vocational education in North-East, Nigeria. The specific objectives of this research are as listed below:

1. To ascertain the generic skills possessed by female students in tertiary institutions offering technical and vocational education in North-East, Nigeria.
2. To determine the Personal attributes of female students in tertiary institutions offering technical and vocational education in North-East, Nigeria.

Research questions

1. What are the generic skills possessed by female students in tertiary institutions offering technical and vocational education in North-East, Nigeria?
2. What are the personal attributes of female students in tertiary institutions offering technical and vocational education in North-East, Nigeria?

Methodology

The study adopted a survey research. The research area was North-Eastern states of Nigeria, The population of the study was all the female students in the tertiary institutions offering technical and vocational education in the study area. Purposive random sampling technique was used to select 142 final year NCE III female students of technical and vocational education 2020/2021 academic session in three (3) states. A five- points rating scale (summated scale) response mode was adopted to express the respondents' opinions. According to Nworgu (1991) as cited in Mustapha (2014) in this scale, an individual is expected to indicate his degree of responses, these response options are weighted and by summing up an individual's responses to all statement s, a total score is obtained which will help determine that person's standing on variable or attribute been measured. hence, this scale is called summated rating scale. Items were constructed on a sclale HP= Highly Possessed; P = Possessed, MP= Moderately Possessed; SP= Slightly Possessed then NP = Not Possessed. Means and Standard Deviations were employed in data analysis. Means of 2.50 and above were interpreted as "skill possessed" while means below 2.50 were interpreted as "Not Possessed". The reliability estimate of the instrument was carried out on the tools Cronbach's alpha using SPSS 21.0 version. 0.98. These instrument were administered by the researcher and two (2) other research assistants. Research questions were analysed using Mean and Standard Deviation statistics.

Table 1: Mean and Standard Deviation of the Respondents' Responses on the Generic Skills Possessed by Female Students in Tertiary Education Institutions Offering Technical and Vocational Education in the North-East, Nigeria

TVE Institution	Mean	SD
Colleges of Education	3.94	1.98
Polytechnics	3.65	1.91

Table 1 shows that, the generic skills possessed by female Students in the Colleges of Edcuation had an average mean score of 3.94 with SD of 1.98. Also Female students in Polytechnics offering technical and vocational education had an average mean score of 3.65 with SD of 1.91. These are also determined based on difference revealed by the highest overall mean level of their highest points obtained based on their employable skill possessed.

Table 2: Mean and Standard Deviation of the Respondents' Responses on the Personal Attributes Possessed by Female Students in Tertiary Education Institutions Offering Technical and Vocational Education in the North-East, Nigeria

TVE Institution	Mean	SD
Colleges of Education	4.09	2.01
Polytechnics	3.50	1.74

Table 2 displays the personal attributes of respondents in Colleges of Edcuation having a mean of 4.09 with SD of 2.01. While the mean score in personal attributes of those female students in Polytechnics offering TVE was 3.50 with SD of 1.74. This revealed their personal quality in the aspect of personal attribute skill of employability which was high.

Finding of the study

1. As a whole, the level of employability skills among the respondents are was highly moderate.
2. Six out of the seven aspects of generic skills stressed are at the medium level whereas only the aspect of personal quality is in the high level. The aspect that has the lowest score is one of the aspect of generic skill in polytechnics, while the aspect that has the highest score is the aspect of personal quality in personal attributes.
3. Female students in Colleges of Edcuation have higher generic skills in aspect of employability skill than female students in polytechnics.

Discussion of the results

Table 1 presented the results of the analysis on mean scores of female students on both Colleges of Edcuation offering TVE and the Polytechnics offering TVE in North-Eastern States of Nigeria. From the data, nevertheless, the female students who were possessed generic skills components of employability skills, in Colleges of Edcuation had an overall mean rating score of 3.94 with SD of 1.98 and the polytechnics female students had mean score of 3.65 with SD of 1.91 respectively. The industry considers that the most desirable graduate attributes are the generic skills and knowledge in the fields of vocational and technology education. According to National Quality Council (2005) as cited in Mustapha and Gabasa (2014), employability skills has become a key requirement for the modern worker. This indicates that TVE graduates, in addition to having educational qualifications in their respective fields, must also still have a social nature and interpersonal abilities. Whereas, their technical skills can continue to be deepened in the industry where they work. TVE graduates can be flexible and quickly adaptable in a new work environment. This result has a huge impact to the graduates who have an implication that there are other factors sought by the industry in recruiting workers.

This significant difference in their overall mean rating scores between the female of the Colleges of Edcuation and polytechnics may be attributable to the nature of their studies that exists between the two different learning environment leading to better mean average scores of facts among the other nature of academic discipline with motivational forces in their respective institutions. This may well be an indications that the sequential mode of academic backgrounds right from home or their institutions. In some larger environment of work, workers who have critical thinking are needed to face the problem being faced by the organization. By having problem-solving competencies and analytical thinking will later have an impact on making a quick and appropriate decision. Therefore, TVE graduates should ideally be able to adapt quickly to these skills because they have felt an internship at work first, so that it helps apply and practice knowledge effectively at work. More so, system and technology skills and use of technology have become a must for every worker. In line with that, every worker must be able to choose and use the technology that will be used so that it can help his work. However, in modern industries, it is a priority that companies recruit workers who have creative and innovative skills (Wickramasinghe & Perera, 2010). Workers are required to think creative and innovative so as to produce an idea, the idea and novelty can bring dynamic changes to the progress. Because workers who have good self-discipline will have an effect on work productivity (Hari, *et al.,* 2020). The quality of self-discipline is certainly a climax of the corporate climate that improves the quality of self-discipline. Implicitly, skills are seen as work capabilities that are considered important (Dinning, 2017).

In other hand, data analysis on Table 2 shows that the quality of Personal attributes disposition of female students in tertiary institutions offering TVE on their employability in North-East, Nigeria had an overall mean score **of** 4.09 with SD of 2.01 and those female student with Personal attributes in Polytechnics offering TVE also had mean average score of**.** 3.50 With SD of 1.74**.** This finding is consistent with that of Ahmed, *et al.,*(2012) who reported that personal and social skills are closely related to skills related to fellow humans and the skills of managing tasks or work. According to Rodzalan & Saat, (2012), Personality has a relationship with one's motivation and culture. For example, the employee ethics are given a job desk by the boss if the worker has good response, then he/she will have a tendency to work with full motivation and awareness. That way, the employer becomes satisfied because the worker is because he has a good quality performance at work. So that it will automatically affect the progress of his/her career, even more broadly to maintain jobs in his field (Drange, *et al.,* 2018).

Conclusion

This literature review helps in recommending a list of employability skills needed by TVE students and graduates. The attributes are taken from several research results that have been verified by experts. The implications of this study will help academics in recommending a set of employability skills that are prioritized by industry. In the future, academics need to prioritize the contents of employability skills to highlight the gap between the skills they have and the skills needed by the industry, so that they can be a solution to minimize the employability skills gap. The importance of working skills needs to be possessed by academics student. The industries have set criteria for the desired standard. Many factors also affect employability skills such as in gender, work experience in self-motivation. From this review, it is necessary to have comprehensive and dynamic changes in order to form the contents of high employability skills. In the middle of extracurricular activities in TVE can be integrated with the training that forms characters such as self-management, leadership, social skills, and problem solving etc. The good quality of employability skills greatly influences the sustainability of their career development in working. These employability skills directly provide a positive charge so that TVE graduates can adapt quickly and grow their work readiness. This can be explained between the needs of the workforce and the expected skills desired by the any organization. Based on the preceeding analysis and interpretations, the study revealed that, difference between the overall mean ratings of female students possessed employability skills in Colleges of Edcuation with their counterpart, in polytechnic offering TVE in the North-Eastern States in aspects of their generic skills possessed by the female (gender) were clearly confirmed.

Recommendations

1. Stakeholders should adopt gender-friendly employability skills framework.
2. Educational curriculum needs to be re-examined with a view to ensuring that the education received by students is relevant and up to date.
3. Guidance and inspirations motivation needs to be given to students regarding the ways to increase employability skill from time to time in order to be excellent workers.

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DETERMINANTS OF CAREER PREFERENCE AMONG STUDENTS OF TECHNICAL AND VOCATIONAL EDUCATION IN COLLEGES OF EDUCATION IN NORTH-EAST, NIGERIA

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Abstract: *This study assessed the career preference among Technical and Vocational Education students in colleges of education in North-East, Nigeria. Three three research questions were formulated to guide the study. The target population seven hundred and seventy-five (775) students, consisting of of-all the students in technical and vocational education section in the colleges of education in North-East, Nigeria. Out of which one hundred and sixty-three (163) respondents were sampled. The research instrument was a structured questionnaire with four likert response scale. The method of data analysis was descriptive (mean). The findings of the Study reveals that parental influence are highly affect career preference among Technical and Vocational Education students of colleges of education. It suggest that there is highly influence of peers on career preference among Technical and Vocational Education students of colleges of education. It also revealed that societies has significant influence on the careers reference among Technical and Vocational Education students of colleges of education. Based on the findings of the study, the study recommends that: Government and non-governmental organization should map out strategy for career information exposure and effective dissemination to students. Government should ensure institutions and government agencies have been engaged in career preference counseling among Technical and Vocational Education students of Colleges of Education in North-East, Nigeria. Government should government should increase more support in the area of capacity building in term of enlighten, training youth and providing loans to students in subsidising interest career rate of Technical and Vocational Education students of Colleges of Education in North-East, Nigeria.*

Keywords*: Career Preference, Technical and Vocational Education, Skills Acquisition*

Introduction

Technical and Vocational Education reported that regardless of greet effort put forth by families, government agencies and non-government agencies, many student encounter difficulties in the transition from the world of school to that work. Investigating and better understanding the myriad factors that contribute to career choice i9s a topic of recurring interest in our schools today. To guide students in their career decision making, socio-demographic factors play a central role in this file long process. These factors include parental influence, peer group, and societal influence. Therefore, career preference is one of the many important choice students will make in determining future plans. This decision will impact them throughout their lives. Brown (2002) describes the process of choosing a career as that which estimates one's ability and values, estimating the skills and abilities required for success in a given occupation, and estimating the work values that will be satisfied by the various occupational alternatives available. One of the objectives of technical and vocational education program is to produce graduates who are equipped with knowledge and skills to be productive citizens with a view to promote economic development even after high school. Several studies show that students of Technical and Vocational Education usually faced with a dilemma in making a career choice decision in their lives (Issa and Nwalo 2013; Macgregor 2014). Choosing a career path is a huge part of a young man or woman's life. A lot of students go through college without knowing what career path they want. Before students can pick a career path they need to experience what that career is like and what it involves. Career can be conceptualized more broadly in terms of individual development in learning and work throughout life and this includes voluntary work and other life experience (Taylor, 2008). Popoola (2004) refers to career as a job or profession for which one undergoes regulated education and training over a period of time and which one intends to follow for the whole of one's life. It is thus a chosen pursuit, life work and success in one's profession.

Career, therefore is a choose pursuit, lifework or success in one's profession, it is the sequence of major position occupied by a person throughout his life time. College students choose their job fields for many reasons. The factors that affect this decision include family, passion, salary, and past experiences. In addition to these factors, race and gender can also affect what field a student may choose. Some professions have greater percentages of a certain gender or race. Another thing that plays a big role in a student's decision of what field to study is the people or role models in his or her life. These role models can include a parent, teacher, or a recent employer. When students are choosing a career, they may not have all the information about the job they are pursuing. The job may involve more Mathematics or Science than students are prepared to study. Students may like one aspect of a certain job and not understand what other aspects come with that profession. For example, some students may want to be veterinarians because they enjoy being around animals, but students may not realize how much school work is required to become a veterinarian. Also, students may not be open to all jobs in their area of interest. Over time, certain job fields have peaked in numbers versus other job fields; this can form a pattern. Career guidance was described by Organization for Economic Cooperation and Development and Commission of the European communities (2009) as services and activities intended to assist individuals of any age and at any point throughout their lives to make educational training and occupational 'choices and to manage their careers. Career guidance is often thought to incorporate career information, career education and career counselling. It should aim to help people not just to enter work but also to remain 'in employment and ultimately to move on to a better job. Therefore, good career guidance has the potential to raise aspirations and broaden horizons and can help people to develop self-awareness and resilience to source, and evaluate information and make sound decisions about learning and work. Career decision is the act of a person in choosing or selecting one of the two or more alternatives of career available at a given time. Career decision is one of the major decisions which are inevitable in life. It is therefore important to be aware of the context in which decision making occur.

Parents are the primary authority in influencing sex role, socialization, providing social skills training, promoting character development and developing a sense of responsibility. According to Kniveton (2004), the family can provide information and guidance directly or indirectly, to influence a young person's career choice. For example, parents offer appropriate support for certain occupational choices which tend to follow their own (Small & McClean, 2002). Parents' expectation and support are important factors in influencing career decisions, maturation and future educational/occupational attainment (Guerra & Braungart-Rieker, 1999). Parents can have an influence on their child's career development by positively reinforcing or punishing certain behaviors that can encourage or discourage certain interests or siblings-can be a source of challenge and competition and a basis for comparison of abilities, thus providing a context for identity formation (Altman & Royston, 2006). According to Pastorelli, *et al*, 2008), studies in Nigeria show that rural students tend to seek help from parents more than urban students and that parents more than teachers play a major role in the career choice of students. In a research conducted by Cassar and Cutajar (2004) that parents perceive that their influence is important, and they make it a point to exert their influence in one way or another. Children may be discouraged from exploring and considering other non-traditional career paths, even if their natural abilities and talents are more in agreement with a different professional or career life than that of their parents. On the other hand, parents may also become overly-involved in career decisions because they want their children to be more content in a career than they are in their own jobs. Children may begin to identify and accept their parents' views and neglect to challenge them or assess their validity, with negative consequences on their own career choices. Parental involvement was found to be the most significant predictor of career preference in gender dominated occupations (Salami, 1999). Parental involvement refers to the extent to which parents or family members are involved in the career plans of children (Salami, 1999). According to Kniveton (2004), the parents can 'provide information and guidance directly or indirectly, to influence a young person's career choice. For example, parents offer appropriate support for occupational choices which tend to follow their own (Small & McClean, 2002).

Supportive friends or peers have a crucial influence on the career planning of students and making key life decisions (Farmer, 2001; Mojgan, *et al.*, 2013). Students' career planning is not only influenced by the overall supportive mindset of their peers but also by the opportunity to learn from them (Mayland, *et al.*, 2005). The ability of peers to influence the behaviors and attitudes of the adolescents is magnified when adolescents perceive that their parental relationship is negative or deficient in support and guidance Alika, (2012). Stuart (2000) contends that peers' attitude toward gender and ethnicity may increase or decrease a person's confidence in pursuing a career. When experts talk about career preference, they are usually referring to someone deciding what he/she wants to do to make a living (Dawn-Lemanne, *et al.*, 2013). A career preference choice is the process of determining a field of learning that requires certain knowledge and skills, acquired through a specific educational program which results in a certificate or degree attesting to your accomplishment (Valentine & Powers, 2013). Since the average person works 45 to 50 years in his or her lifetime, finding a satisfying career and not just a job is important. Career preference choice has therefore become a complex task today as one has not only to make the career planning but also to do an exhaustive career research before making career choice so as to adjust with the evolving social economic conditions (Edwards & Quinter, 2011). However most students who are in secondary schools doing not have accurate information about occupational opportunities to help them make appropriate career choices. According to Kerka (2000) career Preference choice is influenced by multiple factors including personality, interest, self-concept, cultural identity, globalization, socialization, role model, social support and available resources such as information and financial. Bandura, *et al.*, (2001) states that each individual undertaking the process is influenced by several factors including the context in which they live in, their personal aptitudes, social contacts and educational attainment. In this regard, the study sought to investigate the effects of career preference among technical and vocational education students in colleges of education in North-East, Nigeria

Statement of the problem

In spite of all aims and objectives of Technical and Vocational Education at the college level, many students encounter difficulties in the transition from the world of school to that of work. Government spend a lot of resources in education, there should be a well-known link between education and progression into career and the world of work. Students in the modern and fast changing world are trying to seek for those careers which would ultimately led them to achieve fairly in life. Therefore, to choose the career which provide them fair chance in life, success, satisfaction and approved from both family and society is his prime focus. However, the choice of career by an individual is influenced by various factors and among them parental, peers, and society influence very important. Each individual undertaking the process is influenced by many factors, including the context in which they live, their personal aptitude and educational attainment. However, in becoming an entrepreneur certain factors need to be considered, people may have different intention. Hence, we investigate factors affecting career preference of students of technical and vocational education in colleges of education in North-East, Nigeria.

Purpose of the study

The main purpose of the study is to investigate into the factors affecting career preference of students of technical and vocational education in colleges of education in North-East, Nigeria. Specifically, the study sought to:

1. To assess how parental influence affect career preference among technical and vocational education students in colleges of education in North-East, Nigeria.
2. To examine the influence of peers on career preference among technical and vocational education students in colleges of education in North-East, Nigeria.
3. To determine how society influence career preference among technical and vocational education students in colleges of education in North-East, Nigeria.

Research questions

1. To what extent does parental influence affect career preference among technical and vocational education students in colleges of education in North-East, Nigeria ?
2. What is the influence of peers on career preference among technical and vocational education students in colleges of education in North-East, Nigeria ?
3. How does society influence career preference among technical and vocational education students in colleges of education in North-East, Nigeria ?

Methodology

Survey design was adopted in this study. The population of this research work as 2019/2020 Academic Session was seven hundred and seventy-five (775) students which made up of-all the students in technical and vocational education section in the colleges of education in North-East, Nigeria. Based on the size of the population, random sampling technique is used to select the respondents from the population of study. According to Uzoagulu (2011) sample is a selected group which gives a fair representation of the entire population. A total of one hundred and sixty-three (163) respondents were sampled for this study. A structured questionnaire developed by the researchers was used in collecting data from the respondents. In order to facilitate statistical analysis of the responses, 4-pont rating scale based on: Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) each carrying a weight of 4, 3, 2, and 1 respectively. The researchers with the help of 2 research assistants administered the instrument among the randomly selected respondents from the department of technical and vocational education in colleges of education North-East, Nigeria. Means was used for data analysis taking a threashold mark at 2.50. This means that all scores upto 2.50 were considered as Agreed.

Results

Table 1: Mean Effect of Parental Influence on Career Preference Among Technical and Vocational Education Students of Colleges of Education in North-East, Nigeria

Items	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Mean	Remark
Parental occupation influence the choice of career.	69	45	20	29	3.50	Accepted
Relatives' advice has impact on my career preference	70	42	21	30	3.40	Accepted
My parents' advice influenced my career preference	80	45	28	10	3.80	Accepted
My parents' income influence the choice of my career	50	50	43	20	3.00	Accepted
Pressure from my family members	30	10	98	25	1.20	Rejected

Table 1 shows the extent of parental influence affect career preference among technical and vocational education students of colleges of education in North-East, Nigeria. Item 1 showed 3.50 mean of the respondents which suggest that parental occupation influencing the choice of career reference among technical and vocational education students. Item 2 suggested 3.40 mean of the respondents which means that relative advice has impact on career preference among technical and vocational education students. Item 3 showed 3.80 mean of the respondents parents advice influence students career preference. Item 4 revealed 3.00 mean of the respondents which means that parents income influence students choice of career. Item 5 deduced that 1.20 mean of the respondents which reveal that pressure from family members may not influence the choice of career among technical and vocational education students.

Table 2: Mean Influence of Peers on Career Preference among Technical and Vocational Education Students of Colleges of Education in North-East, Nigeria

Items	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Mean	Remark
Having the same career as my peers influenced my choice	90	40	20	**13**	3.90	Accepted
Preference of peers influences the choice my career	40	51	52	20	2.70	Accepted
Friend's approval of future career affected my choice	91	39	25	8	3.90	Accepted
Mentorship by peer influenced the choice of my career	94	50	10	9	4.00	Accepted
Peers' initiative influenced my career preference	30	40	33	60	2.10	Rejected

Table 2 shows influence of peers on career preference among technical and vocational education students of colleges of education in North-East, Nigeria. Item 1 showed 3.90 mean of the respondents which suggest that having the same career as peers will influence technical and vocational education students' career choice. Item 2 showed 2.70 mean of the respondents which means that the preference of peers influences the choice my career. Item 3 revealed 3.90 mean of the respondents which deduced that friend's approval of future career affect the choice of student's career preference. Item 4 showed 4.00 mean of the respondents it suggest that mentorship by peer will influence the choice of my career preference. Item 5 showed 2.10 mean of the respondents which reveal that peers initiatives were not influencing career preference among technical and vocational education students of colleges of education in North-East, Nigeria.

Table 3: Mean Societal Influence on Career Preference among Technical and Vocational Education Students of Colleges of Education in North-East, Nigeria

Items	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Mean	Remark
Availability of the job opportunities in the society	67	71	14	11	4.00	Accepted
Living in an influencing environment	32	51	61	19	2.50	Accepted
Influence of pportunities and societal privileges	44	51	41	27	2.90	Accepted
Entrepreneurial benefits in some business ventures	22	29	49	63	1.50	Rejected
Influence of economic stability in the country	19	10	62	72	0.80	Rejected

Table 3 shows societal' influence of the career preference among technical and vocational education students colleges of education in North-East, Nigeria. Item 1 showed 4.00 mean of the respondents which revealed that availability of the job opportunities in the society are strongly influence the preference. Item 2 showed 2.50 mean of the respondents it means that living in a highly influencing economic development can influence career preference among technical and vocational education students colleges of education in North-East, Nigeria. Item 3 showed 2.90 mean of the respondents which suggested that opportunities and societal privileges influence career preference among technical and vocational education students colleges of education in North-East,

Nigeria. Item 4 showed 1.50 mean of the respondents which means that entrepreneurial benefits in some business ventures do not influencing business student in career preference among technical and vocational education students colleges of education in North-East, Nigeria. Item 5 showed 0.80 mean of the respondents which means that economic stability in the country do not influence career preference among technical and vocational education students colleges of education in North-East, Nigeria.

Findings of the study

1. Research reveal that parental influence are highly affect career preference among technical and vocational education students colleges of education in North-East, Nigeria.
2. It suggest that there is highly influence of peers on career preference among technical and vocational education students colleges of education in North-East, Nigeria.
3. It also suggest that societies has significant influence on the careers reference among technical and vocational education students colleges of education in North-East, Nigeria.

Discussion of Findings

The first finding revealed that parental influence are highly affect career preference among technical and vocational education students colleges of education in North-East, Nigeria. This finding agrees with finding of Kniveton, (2014), who examined the influences and motivations on which students base their choice of career. The second finding revealed that there is highly influence of peers on career preference among technical and vocational education students colleges of education in North-East, Nigeria. This finding aligns with Blustein *et al.,* (1997) who examined the role of peer relationship in career development in individuals. The third finding revealed societies has significant influence on the careers reference among technical and vocational education students colleges of education in North-East, Nigeria , The data was analyzed using mean. This finding is in line with a study conducted by Blustein, *et al.*, (1991) examined the societies role plays in the career position of students.

Conclusion

Career preference plays 'a very fundamental and significant role in the life of the individual not only because they determine the pattern of income but also because they affect the individual personality and concepts in life. The career path students choose will affect how they will live the rest of their life. Tools that can help students in their decision for certain career paths include career fairs, job shadowing, or internships. These tools can expose students to more career fields or areas within a certain field that a student did not know about. This study examined the factors affecting career preference among technical and vocational education students in colleges of education in North-East, Nigeria. Descriptive statistics were employed for the data analysis and it was found that parent peers and society have significant influences on career preference among technical and vocational education students colleges of education in North-East, Nigeria.

Recommendations

1. Government and non-governmental organization should map out strategy for career information exposure and effective dissemination to students.
2. Government should ensure institutions and government agencies have been engaged in career preference counseling among technical and vocational education students of colleges of education in North-East, Nigeria.
3. Government should government should increase more support in the area of capacity building in term of enlighten, training youth and providing loans to students in subsidizing interest career rate of technical and vocational education students of colleges of education in North-East, Nigeria.

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TEACHERS' PERCEPTION ON GREENING TVET PROGRAMES TOWARDS GREEN SKILLS ACQUISITION IN THE ERA OF COVID-19 PANDEMIC FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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Absract: *Reform of TVET systems all over the globe as well as in Africa is an essential request in this time of fast-changing world of work for sustainable development. Current study was aimed at finding out perception of teachers toward greening TVET system in an effort to ensure sustainable future in the era of COVID-19 Pandemic. An interpretive qualitative case study methodology has been chosen as it is the best to reveal and provides a rich information on issues under study, Homogenous of purposive sampling was used to select 15 to start with, participant were interviwed untill data saturation level is reached. During institutions visit, official document on COVID-19 protocol and TVET curriculum was reviewed for triangulation purpose, and this is guided by one research questions. Two strategies of grounded theory as open and axial coding were employed to manage the data collected through the use of an inherent feature of NVivo10. The interview transcripts and Field notes was analyzed moving between inductive and deductive mode of analysis. The findings revealed absence of green skill elements in Nigerian TVET curriculum, Thus, the study recommended for greening of technical, vocational education and training, when curriculum review, emphasis should be given* ***on*** *developing moral values in students than usual technical skill for TVET graduate to be green, Teacher's pedagogy also need to be considered as they are responsible for extracting teaching contents from curriculum in an effort to ensure green skill acquisition. Consistent studies in this area are highly suggested.*

Keywords*: Greening TVET, COVID-19 Pandemic and Sustainable Development*

Introduction

The changing nature of labor market has result to increase in the scope of responsibility of TVET system as major producer of workforce. TVET is faced with variety of challenges in the scope and character of new jobs especially during COVID-19 Pandemic, both indigenous and multi-national employers were not satisfied with the contribution of TVET for sustainable development in Nigeria (Bappah & Medugu, 2013). That is, a transition to greening TVET system through green skills that meet the needs of present and future workforce. With an emerging green skills agenda within a sustainable development perspective, the inclusion of moral values in TVET is attracting more and more attention (Kamis, *et al.,* 2017). In an effort to address a green skills agenda in TVET**,** there was an international call to focus on values development as early as 1999 in the recommendations of the second international congress on Technical and Vocational Education **(**Pavlova & Huang, 2009). TVET graduates need to be equipped with a generic green skills not only technical and soft skills, this is to enable them develop green practices in the workplace (Suhadi, & Esa, 2017). Thus, these necessitate reorientation of individual values towards greening TVET system to empowers graduates with new visions of reality and the means of achieving them.

Statement of the problem

The fast-changing nature of world of work in the era of COVID-19 Pandemic necessitate a TVET systems reform toward green skills acquisition for sustainable development. However, Nigerian TVET curriculum is faced with the problems of attaching much emphases to theoretical knowledge than practical skill acquisition (Muhammad, 2017), These challenges will definitely give rise to green skills shortages for green jobs in Nigeria if not arrested, and that the number of green jobs could reach 100 million worldwide by 2030, which is estimated at 2% of the future workforce (Asia Business Council, 2009)**.** Thus, refocusing TVET towards green skill acquisition during COVID-19 Pandemic remains a doubtful issue as moral values for greening TVET are yet to be fully explored (Pavlova & Huang, 2009). Hence the need to refocus on what is to be incorporated into the existing Nigerian curriculum that may lead to new types of skills and competencies for the future green jobs during and after COVID-19 era.

Purpose of the study

The main purpose of this study was to explore teachers' perception on greening TVET system during COVID-19 Pandemic for sustainable development in Nigeria. Specifically, the study sought to determine the requirements for greening TVET system in Nigeria towards green skills acquisition for sustainable development in the era of COVID-19 Pandemic.

Research question

1. What are the requirements for greening TVET system in the era of COVID-19 Pandemic towards green skills acquisition for sustainable development in Nigeria?

Methodology

To address the research question, an interpretive qualitative case study methodology was chosen as it is the best approach (Merriam, 2009). Homogenous of purposive sampling was used to select 15 participant to be interviwed, Semi-structured protocols used in the focus groups and individual interviews contained six types of questions (Flick 2009; Glesne 2006; Patton 2002). In addition, the interview was conducted three times with each participant to affirming trustworthiness (Seidman 2006). The interview sessions were audio-recorded and transcribed to facilitate data analysis. During institutions visit, official document was reviewed for triangulation purpose, while at analysis stage, open and axial coding system of grounded theory methodology was employed to manage data as it allows for analysis of emerging data (Strauss & Corbin, 1990). Analysis was achieved through the use of an inherent feature of NVivo10. The reduction and analysis of the data was conducted after the first interview session occurred simultaneously throughout data collection processes, data from interview was analyzed inductively. The researchers ensured that themes and categories that emerged from initial coding process exist in subsequent data. This process was maintained until the data appeared to be repetitive.

Quick review on greening TVET for sustainable development

Green skills include technical skills, knowledge, attitude, ability and value that are needed for live (Diep & Hartmann 2016) the role of green skills cannot be over emphasized because of its uniqueness in meeting necessary skills demand for green jobs. Green skills have emerged as significant factor in the production of competent individuals who will turn the nation's economy around. According to Isa, *et al.,* (2019). Green skills refer to knowledge, attitudes values, and abilities needed in life for growth Green skills are needed to develop and support a society with an aims to reduce negative activities and cope with the challenges of sustainable future. Greening TVET system ensure adequate competencies that guarantee sustainable future.

Greening is regarded as a process of adapting knowledge and practices with the aim of aligning them with the overall concept of sustainability (Martinez-Fernandez, *et al.,* 2010). Green-skills elements should be included in technical and vocational education for greening the existing system, such elements enhance problem-solving skills in the skills manage life, (Kamis, *et al.,* 2017). Incorporating moral values are the key importance to address green skills agenda in TVET, moral values should underpin the educational processes to help students understand the need for and ability to be involved in creation of a sustainable future Education **(**Pavlova & Huang, 2009**).** TVET graduates must be prepared with generic green skills such as employability skills among others (Thirupathy & Mustapha, 2020). Preparation for the future work should equip people with competencies, knowledge, values and attitudes to become productive citizens who contribute to sustainable societies **(**Majumdar, 2010**).** Effort should be built upon systematic adaptation and revision of existing TVET curriculum, pedagogical practice and approaches as well as Green culture, these can only be achieved by focusing on attitudes, behaviors, strengthening green values and ethical standards (Majumdar, 2011). Green-skills elements such as knowledge, attitudes, abilities, and values should be included in TVET curriculum (Pavlova & Huang, 2009). More emphasis should be given **on** developing attitudes and knowledge skills rather than technical skills.

Findings and discussion

It was found that the issue of green skills has not been specifically mentioned in Nigerian TVET curriculum, it was noted that the curriculum emphasizes on technical skills. Thus, the development of green skill can be done through intra-curricular activities, these is achieved **by** reconsideration of existing TVET curriculum as it seems to be an urgent priority. The first interviewed participant reiterated that more emphasis should be given on developing moral values considering the present era of COVID-19 Pandemic as well as COVID-19 protocol as TVET graduates interact with other ndividuals in the workplace**.** This finding concurred with Pavlova & Huang (2009) eho advocated that incorporating moral values are key to addressing green skills agenda in TVET, moral values should underpin the educational processes to help students understand the need for and ability to be involved in the creation of a sustainable future Education. A participant was quoted saying:

> "Considering the level of public awareness on green skills, the government should try to increase level of awareness on Green skills, and the need to incorporate moral values, which I may authoritatively say is absent, in our TVET curriculum. While doing so, COVID-19 protocol should be observed in the present era of COVID-19 Pandemic. These are the golden values needed by individuals to support sustainable and effective utilization of resources in the workplace".

The participant's suggestion calls for change in teaching paradigm for vocational education that is currently focused on competency development to now emphasize moral values through vocational training. Green skills acquisition in Nigeria is not feasible with the TVET operational curricula. TVET teachers should, as well, be re-trained for green skills that meet the industrial requirements during and after COVID-19 Pandemic. These findings are in line with Majumdar (2011) who stressed that efforts should be built towards systematic adaptation and revision of the existing TVET curriculum, pedagogical practices and approaches with green culture. These can only be achieved by focusing on attitudes, behaviours, strengthening green values and ethical standards. Another participant pointed out that:

> "Definitely there is need to review our TVET curriculum by infusing green culture into its curriculum for mutual benefits of both students and their teachers. This will in turn requires re-training of our teachers as they are responsible for the curriculum implementation. Such efforts could offer the TVET graduates the opportunity to face the present and future green jobs challenges".

Such comments by the participants clearly show that there is need for awareness on green skills to ensure adequate skills that guarantee sustainable development n the era of COVID-19 Pandemic and beyond. This can only be achieved with dedicated, well-traind and highly motivated TVET teachers that are ready to introduce green skills in the teaching process. Despite new teaching innovations lecture based delivery method is still predominant in Nigerian TVET institutions. thus, training TVET graduate on green skills must ensure matching green jobs that can absorb them.

Conclusion

As part of research contribution, it was revealed and highlighted that green skills are essential elements in today's and future world of work, especially when considering challenges in the era of era of COVID-19 Pandemic. Hence the need to increase level of awareness on green skills. It is believed that with a well-articulated curriculum, TVET graduates will become green with green skills that enable them contribute effectively in both during and after COVID-19 era. Consistent studies in this area are highly suggested so that stakeholders would be fully aware of deficiencies in curriculum toward greening TVET, and such green element required to be incorporated in the curriculum for sustainable future.

Recommendation

TVET curriculum should be greened to amply capture all those green skills elements as attitudes, values, and abilities needed in our industries in the era of COVID-19 Pandemic and beyond.

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INNOVATIVE TECHNOLOGIES AND SUSTAINABLE E-COMMERCE IN COVID-19 PANDEMIC ERA

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Abstract: *Innovative Technologies has the power to develop an industry and transform business. This article aims to identify different innovative technologies and how it sustains E-commerce in covid-19 pandemic era. Two Research questions and hypothesis guided the study. A descriptive survey research design was adopted. A five point likert scale structured online questionnaire was administered to help collect data. The population was made up of 100 respondents, comprising of 70 E-marketers or traders using innovative technologies for their business, and 30 lecturers and Instructors exposed to innovative technologies in their career as TVET teachers in technical colleges and Universities in Enugu state Nigeria. The reliability co-efficient of the instrument was found to be 0.80. Data collected were analyzed using mean for the research questions, while the hypotheses were tested using t-test at 0.05 level of significance. Major findings of the study included the fact that innovative technologies have the capacity to promote business in the pandemic era and also that better ways of teaching E-commerce will improve entrepreneurship outcome. Hence, it was recommended, among others, that regular training should be organized to abreast teachers and young entrepreneurs with new technological innovations.*

Keywords: *Innovative Technologies; Career Development, Sustainable E-Commerce, Covid-19 Pandemic*

Introduction

Innovative technology has transformed the economy. Value creation for customers has shifted from the physical good to an economy that favours service, information and intelligence as the primary source of the value creation. At the centre of this economy transformation is E-commerce. Innovative technologies are radically changing the face of business and organizations. There is a growing interest in the use of e-commerce as a means to perform business transactions over the internet. In the past few years, the term of e-commerce is everywhere across the entire world. People define e-business in various ways and images that it has no standard definition. E-business or e-commerce is often interpreted as selling products over the internet. In its broader sense, e commerce can be interpreted as the use of electronic transmission mediums to engage in the exchange, including buying and selling, of products and services requiring transportation, either physically or digitally, from location to location. Electronic commerce involves all sizes of transaction bases and it requires the digital transmission of transaction information. In commercial point of view, e-commerce can also be defined as transaction activities between firms and individuals, also it involves in the exchange of money, goods or duties. This definition clearly excludes email, telephone, fax, as well as internal computing accomplished by accounting sales, inventory, treasure, personnel or executive information systems. In short way of expressing this definition will be by excluding inter-organisational systems in total. There are many forms of commercial transactions that can occur in daily life from business to business or B2B such as electronic data interchange, auction markets etc. Commercial transactions can also occur in B2C or business to consumers, such as retailing in the internet and electronic brokerages. E-commerce has tried to take advantage of economies in single point keying to reduce errors and cycle time, a high degree of customizability of product or services to meet customer needs and customer interaction with data bases at very low marginal cost. Accordingly, there are five areas in which companies can introduce innovation; Generation of new or improved products; Introduction of new production process; Development of new sales market; Development of new supply market; Reorganization and/ or restructing of the company.

Innovation

There are various definitions of the term "innovation" which derives from the Latin *" innovation"* which means the creation of something new. Johannessen, *et al.,* (2001) Innovation refers to the economic application of new ideas that will be transformed to the commerce. Subrahmanya (2005) Innovation is the commercial or industrial of something new: a new product, process or method of production, a new market or source of supply, a new form of commercial business or financial organization, Lee and Chew-Guing (2007) Innovation means making new products and offering new services, or adding new value to existing ones, Boege (2009) . It's based on the results of new technological developments, new combinations of existing technology or the utilization of other knowledge acquired by the company, Weiermair (2004). Innovation is the implementation and the application of a new idea related to a new product or service, a new marketing method, a new organizational methods in business practices, workplace organization or external relationsJoshi (2008) Innovation is the degree to which value is created for customers through enterprise that transform new knowledge and technologies into profitable products and services for national and global markets. The above definition clearly distinguishes innovation from minor changes in the makeup and/or delivering of products in forms of extension of product lines, adding service components or product differentiation. It covers a wide range of activities to improve firm performance, including the implementation of a new or significantly improved product, service, distribution process, manufacturing process, marketing or organizational method. Innovation is not related to production fields only, but there are other fields and activities which can be innovated as the following:

1. ***Process Innovation***: is the adoption of new or significantly improved production methods. These methods may involve changes in equipment or production organization or both. The methods may be intended to produce new or improved products which cannot be produced using conventional plants or production methods.
2. ***Marketing Innovation***: Is an innovation that satisfies customer needs and develops a competitive advantage through differentiation along one or more of the following: desired product features and design, size, usability, quality, time, price, cost savings/ incremental revenues. In other words is the implementation of new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.
3. ***Organizational Innovation***: is the implementation of a new organizational method in the firm's business practices, workplace organisation or external relations. It can be intended European Scientific to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction, etc.

E-commerce

E-commerce is part of e-business, where the scope of e-business is broader, not just commerce but also requires infrastructure such as:

1. ***Devices:*** Include computers and servers, Selectman and wave information, cables and modern techniques of communication.
2. ***Software***: Include:- operating software, Internet software trafficking, in addition to the software packages of electronic commerce (which is a special software allows processes to complete the sale and purchase follows online).
3. ***Service Providers Connectivity*:** Open public networks (such as the Internet), which provides Internet service in the States.
4. ***Enabled Services***: The completion of services related to commercial transaction such as the Declaration and payment methods and delivery, services to verify eligibility. In addition to the electronic infrastructure to be providing financial environment appropriate methods of electronic payment and intensive use of modern means of payment for credit cards.

Areas in which they are used e-commerce

E-commerce exist in some areas, including:

1. ***Retailing:*** For example, trade books and magazines, where the search for the name of the book or content, know the price and in which manner of electronic payment process and to be recognized by the publisher .
2. ***Banking and Finance:*** Banks provide electronic services, which the simplest query on the account and follow-up stock prices and the sale and purchase of shares.
3. ***Distribution:*** For example, the distribution of electronic products, programs and services to computer images and the distribution pictures and films and tapes of musical.
4. ***Engineering Designs:*** Could participate in the design of a new product without a presence in the same location of during the working group is the best-known example in this area by Ford Motor Company formation of a working group to design a new engine works in the membership of four different geographic locations .
5. ***Business Support:*** An example of this system of trade exchange between the companies introduce Alctulojat electronic products, and to carry out exchange a number of different phases and supporting various payment systems and the exchange of documents and provide after-sale services.

COVID -19 pandemic and its impact on e-commerce

The worldwide spread of the COVID-19 pandemic has agitated how people buy commodities and other services and how they are involved in e-commerce. This is fully based on the current situation and current information. Consumers have a turnabout from shops, supermarkets, and shopping malls to online portals and other shopping apps for the purchase of products, ranging from basic commodities to reputed brands. Humans respond to crises in different ways. The COVID-19 crisis accelerated an expansion of e-commerce towards new firms, customers and types of products. It has provided customers with access to a significant variety of products from the convenience and safety of their homes, and has enabled firms to continue operation in spite of contact restrictions and other confinement measures through innovative technologies. Despite persistent cross-country differences, the COVID-19 crisis has enhanced dynamism in the e-commerce landscape across countries and has expanded the scope of e-commerce, including through new firms, consumer segments (e.g. elderly) and products (e.g. groceries). Meanwhile, e-commerce transactions in many countries have partly shifted from luxury goods and services towards everyday necessities, relevant to a large number of individuals. Some of these changes in the e-commerce landscape will likely be of a long-term nature, in light of the possibility of new waves of the epidemic, the convenience of the new purchasing habits, learning costs and the incentive for firms to capitalise on investments in new sales channels.

Despite the efforts of some governments to foster e-commerce during the COVID-19 crisis, persistent digital divides imply that not everyone has been able to participate. Moreover, regulations that are not adapted to e-commerce can create barriers to firms, such as in the case of emerging omni-channel sales models or new modes of delivery. While many of these challenges existed before COVID-19, the current crisis and the new role of e-commerce for individuals and firms has heightened the need for policy action. When faced with an uncertain, risky situation over which we have no control, we tend to try whatever we can to feel like we have some control. The factors which drive the growth of the e-commerce market before the COVID-19 pandemic include strong and steady growth of internet users and rising awareness related to online shopping, increasing online launching of products, low price due to bulk purchase and so on. In addition, an increasing number of exclusive products in the market and lower prices of goods due to the direct distribution channel and economies of scale further contribute to the growth of the global e-commerce market. Moreover, after the COVID-19 pandemic, social distancing and staying home is further expected to push the consumers towards online shopping.

The COVID-19 pandemic has not stopped at national borders. It has affected people regardless of nationality, level of education, income or gender. The COVID-19 pandemic puts a spotlight on the imperative of protecting human capital in times of crisis. In addition to the loss of life and income, the pandemic poses risks to human capital through disruptions in access to essential services, a rise in food prices and breakdowns in supply chains. Households are seeing a rise in poverty, stress, malnutrition and infectious diseases, affecting development outcomes including child and maternal mortality. Altogether the crisis threatens to pose a huge set back to hard-won gains in human capital without rapid, decisive, and coordinated action. However, uncertain consumer demand and supply chain issues can affect the e-commerce industry. The COVID-19 pandemic issue can also affect big merchants such as Wal-Mart, which are experiencing a drop in casual shopping, supply chain disruption, and an increase in purchases of essential toiletries, groceries, and other products. The global e-commerce industry report is segmented based products including electronics, healthcare beauty & personal care and others. The outbreak of COVID-19 had an impact on these segments due to the uncertainty in the supply chain and consumer demand across the globe. E-commerce supply chains are mainly strained by COVID-19 as well as factory closures in China, the US, and other countries. The most affected industry segment due to the COVID-19 outbreak is the electronics products as China accounted for most cases of COVID-19 and as per the International Trade Union Federation (ITUF), the country is the largest producer of the electronic and its parts globally. A considerable amount of China's imports is encompassed of electronic parts that are assembled into finished products, such as consumer electronic products and computers, and then exported.

Statement of the problem

E-commerce has become the other of day as covid-19 pandemic has left us with the social distancing and avoidance of crowed. The big question is then how can we run our business and make profit in the covid-19 era? This question gave rise to the introduction of use of innovative technologies sustainable E-Commerce in pandemic era. This is what the research work terms to address. This study focused on marketing and e-commerce innovative technologies and coverage of this study is e-marketer and TVET teacher using innovative technologies in technical colleges and universities in Enugu state.

Purpose of the study

The main aims to identify different innovative technologies and how it sustains E-commerce in covid-19 pandemic era. The specific objectives are two and they are

1. To identify different innovative technologies to be used for sustainable E-commerce in TVET during Covid- 19 pandemic era
2. To identify how the innovative technologies sustains E-commerce in covid- 19 pandemic era

Research questions

1. What are the innovative technologies to be used for sustainable E-commerce in TVET during covid-19 pandemic era?
2. How the innovative technologies do sustains E-commerce in covid-19 pandemic era?

Hypotheses

H_{O1}: There is no significant difference in the mean responses of male and female teachers and e-marketers on the innovative technologies used for sustainable E-commerce in TVET during covid-19 pandemic era.

H_{O2}: There is no significant difference in the mean responses of male and female E-Marketers on the Career developments for Technical Vocational Education and Training (TVET).

Methodology

The study adopted a descriptive survey. The area of the study was Enugu State and it was conducted in public universities, a government technical college and. The population for the study consisted of all the 10 technical college teachers, 20 lecturers and instructors of vocational and technical education from University of Nigeria Nsukka and the 70 E-marketers/traders using innovative technologies for their business. Since the population of used for this study is not too large, the entire population was used because it was manageable for the study. Structured questionnaire were developed by the researchers and used for data collection, The items were based on a five point rating scale Strongly Agreed (SA), Agreed (A), Undecided (UD), Disagreed (D), Strongly Disagreed (SD) with values of 5, 4, 3, 2, and 1 respectively. The instrument had a reliability level of 0.80. The instruments were face validated by three experts. Two experts from the Department of Industrial Technical Education, University of Nigeria, Nsukka and one expert from the Department of Vocational Education, School of Technical Education, Yaba College of Technology, Lagos.

Reliability of the study was determined using Cronbach Alpha method; the instruments were trial tested on teachers in government technical college Nsukka, University Lecturers of Enugu State University of Science and Technology Enugu State and E-marketer within Nsukka Enugu. Due to the covid-19 pandemic, the researcher decided to use the online platform Google Docs as the platform for administering the questionnaire by the researchers and two researcher assistants. Additionally, the absence of physical contact enhances the respondent's motivation to answer the question, and it also has been proven that respondents tend to be more honest when the interviewer is absent (Heslin, 2003). A data analysis was carried out using SPSS 22.0 as statistical package. The statistical tools employed were, Cronbach alpha, Mean and t-test. Mean was used to answer the research questions while t-test will be used to test the hypothesis at a level of significance 0.05. Any item with mean value of 3.50 and above implies utilized while any item with a mean below 3.50 was considered not utilized. For the test of significance, the probability (p) value was used in comparison with the alpha value of .05, and at other relevant levels. If any item has a probability value greater than .05 (P>0.05) it will be concluded that there is no significant difference in the mean responses of the respondents.

Results

Table 1: Mean and t-test Analysis of the Innovative Technologies to be Used for Sustainable E-Commerce in TVET During COVID-19 Pandemic Era

S/N	Items Statement	$\bar{X}$	SD	Decision	Sig	H_O
1	Big Data Analytics Machine	2.66	0.87	D	0.69	NS
2	Voice Search	3.63	0.75	A	0.10	NS
3	Supply Chain Management	2.07	0.87	D	0.99	NS
4	Instant foreign language translation	2.21	0.81	D	0.56	NS
5	Electronic Funds Transfer	3.84	0.86	A	0.06	NS
6	Electronic Data Interchange (EDI)	4.53	0.71	SA	0.32	NS
7	Automated Data Collection Systems	3.82	0.81	A	0.08	NS
8	Artificial Intelligence (AI)	4.56	1.07	SA	0.08	NS
9	Inventory Management Systems	3.66	0.87	A	0.10	NS
10	Augmented & Virtual Realities (AR and VR)	3.63	0.75	A	0.11	NS

Where: $\bar{X}$= Grand Mean, SD= Standard Deviation, H_O = Null Hypothesis, NS = Not Significant, SA = Strongly Agreed, A = Agreed, U= Undecided, D = Disagreed, SD = Strongly Disagreed

Data presented in Table 1 shows that seven items had their mean values ranging from 3.63 – 4.53 which is above the cut-off point of 3.50, this implies that the teachers and E-Marketers agreed that the items are innovative technologies for sustainable E-commerce in TVET during covid-19 pandemic era, also three items had their mean values ranging from 2.07 – 2.66 which is below the cut-off point of 3.50, this implies that the teachers and E-Marketers did not agree that the items are innovative technologies for sustainable E-commerce in TVET during covid-19 pandemic era. The table also shows that all the 10 items had their significant value to be greater than .05 (P>0.05). This indicated that, there was no significant difference between the mean responses of male and female teachers and e-marketers on the innovative technologies used for sustainable E-commerce in TVET during covid-19 pandemic era therefore the hypothesis which stated that there is no significant difference in the mean responses of male and female teachers on the innovative technologies used for sustainable E-commerce in TVET during covid-19 pandemic era.

Table 2: Mean and t-test Analysis of How Innovative Technologies do Sustains E-commerce in COVID-19 Pandemic Era

S/N	Items Statement	$\bar{X}$	SD	Decision	Sig	H_O
1	It aids better organization and planning skills	3.78	0.59	A	0.55	NS
2	It sustains e-commerce in covid-19 era by promoting the sharing of economic information	4.28	0.81	SA	0.30	NS
3	It exposes the e-marketer to the new career development in e-commerce	3.72	0.60	A	0.31	NS
4	It sustains e-commerce with better time management	3.52	0.62	A	0.47	NS
5	It maintains business and social relationships	3.57	0.88	A	0.86	NS
6	It makes the teaching and learning easier	2.19	0.76	D	0.08	NS

Where: $\bar{X}$= Grand Mean, SD= Standard Deviation, H_O = Null Hypothesis, NS = Not Significant, SA = Strongly Agreed, A = Agreed, U= Undecided, D = Disagreed, SD = Strongly Disagreed

Data presented in Table 2 shows that six items had their mean values ranging from 3.52 – 4.28 which is above the cut-off point of 3.50, this implies that the E-Marketers agreed that the items are how Innovative Technologies do sustains E-commerce in covid-19 pandemic era also four items had their mean values ranging from 1.92 – 2.86 which is below the cut-off point of 3.50, this implies that the teacher did not agree that the items are how Innovative Technologies do sustains E-commerce in covid-19 pandemic era. The table also shows that all the 6 items had their significant value to be greater than .05 (P>0.05). This indicated that, there was no significant difference between the mean responses of male and female E-Marketer on importance innovative technologies do sustains E-commerce in covid-19 pandemic era, therefore the hypothesis which stated that there is no significant difference in the mean responses of male and female E-Marketer on innovative technologies do sustains E-commerce in covid-19 pandemic era was accepted.

Discussion of findings

1. The data presented in Table 1 provided responses to research question one, the findings reveals that all the items listed as Innovative Technologies to be used for sustainable E-commerce in TVET during Covid-19 Pandemic Era are preferred except three items which are New technologies used for sustainable e-commerce in TVET during covid-19 pandemic era, but are not always preferred , these are ***Big Data Analytics Machine***, Supply Chain Management, and Instant foreign language translation.
2. The result in Table 2 revealed that all the items listed are of how Innovative Technologies do sustains E-commerce in covid-19 pandemic era are preferred except one items which is ***It makes the Teaching and learning of e-commerce easier***

Conclusion

Based on the findings of the research, it was concluded that there are several innovative technologies to be used for sustainable E-commerce in TVET during Covid-19 Pandemic Era. Hence, from the responses received from various respondents who supply information on the questionnaire distributed, it has been discovered that innovative technologies seriously aid in the sustainability of e-commerce in TVET during covid -19 era.

Recommendations

1. Individuals, Teachers should develop themselves professionally on the use of innovative technologies.
2. Regularly in-service training should be organized for TVET staff through seminars, conferences and workshops to make them aware of new happenings in their field and the new technological innovation.
3. Adequate training facilities should be provided for all TVET programmes to help in quick learning of this innovative technology.
4. Adequate funds and quality infrastructures should be provided to create a more conducive environment for e-marketers to be trained on the innovative technologies to be used during covid-19 for sustainable e-commerce in TVET programms .
5. More research work should be carried out to produce more innovative technologies.
6. E- marketer should adoprot the innovative technology as it will save them the cost of paying for business places and shops
7. Government, corporate bodies and private bodies should be adequately enlightened on these important of innovative technologies and if possible make laws that will make it possible for easy using of the innovative technologies for business and e- marketing.

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SUB-THEME 3

TVET AND PUBLIC PRIVATE PARTNERSHIP IN THE ERA OF COVID-19 PANDEMIC

PUBLIC-PRIVATE-PARTNERSHIP FOR IMPROVING TECHNICAL VOCATIONAL EDUCATION AND TRAINING DELIVERY IN THE ERA OF COVID-19 PANDEMIC IN NIGERIA

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Abstract:*The study investigates a public-private partnership for improving TVET delivery towards developing employability skills in the era of the COVID-19 Pandemic in Nigeria. A survey research design was adopted. Three research questions and three hypotheses, tested at .05% level of significance, guided the study. The respondents consisted of 139 human resources managers in organised private sectors and TVET lecturers. Data were obtained using a structured questionnaire. The reliability coefficient of the instrument yields α = .76, Using Cronbach Alpha. Mean and standard deviation was used to answer the research questions, while independent sample t-test statistics was employed to test null hypotheses. The findings of the study revealed that: Training resources such as an online library, projectors, interactive multimedia. digital textbooks and internet connectivity are very essentials. There is no significant difference between the mean responses of managers in private sectors and TVET lecturers regarding the private sector's innovative roles in improving training resources and TVET institution's roles in enhancing effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic. Hence, it was recommended that private sectors should be made involved in the training of TVET graduates by identifying demand for skills, feed into curricula development, monitoring and evaluation activities, TVET lecturers should offer quality and effective teaching and learning that will facilitate and promote the development of employability skills.*

Keywords*: Employability Skills, COVID-19 Pandemic, Public-Private-Partnership, Technical Education*

Introduction

Technical Vocational Education and Training (TVET) is an education that provides courses and training programs related to employment to enable the transition from school to work for students and supply the labour market with competent workforce (Moustafa & Moustafa, 2013). TVET is majorly concerned with the development of employability skills. These employability skills form the base upon which individuals within the sphere of TVET are trained. (Chinedu, *et al.,* 2015). TVET is further understood as comprising education, training and skills development relating to a wide range of occupational fields, production, services, and livelihoods (Chinedu & Olabiyi, 2015). The ultimate aim of TVET is to increase the employability of individuals and work for the benefit of the community. As part of lifelong learning, it takes place at secondary, post-secondary and tertiary levels and includes work-based learning, continuing training and professional development which may lead to qualifications (Government of Bhutan Thimphu, 2014). TVET also includes a wide range of skills development opportunities attuned to national and local contexts. Learning to learn, the development of literacy and numeracy skills, transversal skills and citizenship skills are integral components of TVET (UNESCO, 2016). Among the objectives of TVET is to train youths and adults alike for the labour market. With innovations in science and technology, labour market needs have significantly progressed. New challenges must be met to match the education proposed with vocational demands. For graduates within the TVE community to remain relevant, they need to be able to develop capacities to learn continuously through thinking and reasoning, problem-solving, decision making and interpersonal competence (Chinedu, *et al.,* 2015). It is indispensible in manpower development because it allows individuals and societies to unlock their potentials, expand their horizons and adapt to the changes in the dynamic world of work Government of Bhutan Thimphu, 2014). TVET institutions need to anticipate and respond to skill changes needed for successful careers in industrial economies. TVET aims to equip citizenry with the technical and professional skills needed for the socio-economic development. In other words, it prepares people for self-employment and to be a medium of evolution for people to the world of work; by making an individual have a sense of belonging in their communities.

Employability is a fundamental outcome of education and training of high quality, as well as a range of other policies. It encompasses the skills, knowledge and competencies that enhance a worker's ability to secure and retain a job, progress at work and cope with challenges. Individuals are most employable when they have broad-based education and training, basic and portable high-level skills, including teamwork, problem-solving, ICT, language skills, learning to learn skills, and competencies to protect themselves and their colleagues against occupational hazards and diseases. This combination of skills enables TVET graduates to adapt to changes in the world of work (UNESCO & ILO, 2012). Educational institutions must examine ways to address difficulties to smooth the transition from school to work during and beyond the pandemic. Skills deficiency is one of the key challenges in ensuring a smooth transition from school to work and in ensuring employment of young job seekers, particularly TVET graduates by the industries. There is a need to boost greater partnership between government, TVET and business enterprise, aimed to share the industrial sector perspective, policy and identify gap for improving employability skills, competence-based and demand-driven of the school system. An effective TVET system within a country is a critical pillar of any successful economy, it serve as an impetus to boost the value of the nation and its GDP in the global marketplace, effective TVET as well recognises that education and training in any country need to be based on reliable labour market information, demand and employer needs (Olabiyi, 2020). The emphasis on training is preparing work-ready graduates, meaning graduates who are not only employable but who do not require further on-the-job training. The ability of a country to increase the skills of its workforce is a significant concern to TVET institutions, businesses and government. The need to increase employment opportunities and to enhance the workforce's social mobility through improved employability is particularly pressing in the COVID-19 Pandemic.

As of late June 2020, according to UNICEF (2020), 1,089,749,858 learners are affected worldwide by COVID-19 leading to closures of educational institutions. Nigeria is no exception, when schools shut, children risk losing their learning, support system, food, and safety, especially with the most marginalised children who are the most likely to drop out altogether paying the heaviest price. As millions of children remain out of their classrooms for more than nine months, and many more are re-living the upheaval UNICEF fears that too many schools are closing unnecessarily, and not enough emphasis has been placed on taking the necessary steps to engage students in effective learning. Again as students return to classrooms, they will need support to readjust and catch up on their learning. School reopening plans must incorporate efforts to recover children's lost education with meaningful learning engagement through collaboration with the relevant NGOs and agencies.Challenges facing TVET during pandemic demand learner-centred innovative and flexible approaches including a reoriented curriculum to take account of new subjects and issues such as technology, the environment, and cultures, entrepreneurship and the requirements of rapidly growing service industries. However, securing and advancing in decent employment is a big challenge for young people, even in the best economic period and particularly worse during the era of the COVID-19 Pandemic. MacDonald, *et al.,* (2010) perceived that market-driven training requires collaboration and coordination with employers to determine the educational and training needs to meet skill demand. This is a dynamic process as demand and employer need must keep pace with changes in technology and the rise of new skill sets, with this, a responsive TVET system will include survey employers to gather labour market information, such will guide in the training of TVET graduates, employees in need of upskilling, and students. In this situation, governments should prioritise the unique needs of every student, with comprehensive services covering remedial learning, health and nutrition, and mental health and protection measures in schools to nurture children and adolescents' development and wellbeing, students need to be taught a new way of learning in response to the COVID-19 Pandemic which saw schools shut for extended periods. Therefore, TVET must focus on developing employability skills through sustainable, innovative, and effective teaching and learning. To actualise effective development of workforce skills, there is a need to evolve private sectors in the training to create the mood and tone of positive classroom cultures that invite authentic learning which leads to more opportunities for students to positively connect with their peers, and their teachers.

The conceptuality of Public-Private Partnership in TVET, according to Olabiyi, *et al.,* (2014), refers to a contractual agreement between a government agency or authority and a private sector entity that allows for greater private participation in the delivery of public infrastructure projects. It recognises the existence of alternative options for providing educational facilities and services besides public finance and public delivery. The fundamental objective of PPP is to encourage the private sector to use its facility to raise capital and the capability to build projects on time and to budget for the welfare of TVET institutions, without having to compromise its profit motive. At the same time, TVET would retain its responsibility to provide goods and services to the public at affordable rates (Aimola, 2010). Usually, Public-Private Partnerships at a minimum involve an established contract between a private and public sector actor to provide public goods or services, while jointly assuming the risks and responsibilities (World Bank, 2005). This arrangement calls for a judicious approach to decision making and underscores the need for a framework that enables the private sector partner to make reasonable returns on investments without diluting the standards and quality of services provided under public-private partnership arrangements. Partnership may cut across different but mutually inclusive groups of stakeholders bringing skilled and trained manpower in their area of specialization for purpose of national development, self-actualization and productivity (Okwelle & Wordu, 2014). As a result, public sector authorities in developing countries are constantly on the lookout for alternative sources of funds, and one such source is an investment by the private sector through Public-Private Partnership. Ahmed (2010), envisaged that PPP will increase expertise and responsible workers who can solve problems and who have the social skills and attitudes to work together with other workers. TVET institutions in Nigeria should explore ways of using PPPs to prepare TVET graduates for a future career in a workplace that emphasised independence and flexibility, facing the changing future of work.

Statement of the problem

The COVID-19 Pandemic related lockdown and social distancing measures imposed by the government caused not only unprecedented disruption in the provision of education and training but also bring innovation in learning. While access to learning was maintained in some contexts through a rapid shift to online learning, the increased adoption of online teaching by TVET programs has not facilitated the acquisition of practical skills and organisation of work-based learning, which are essential components for the success of the TVET system. Business closures and losses in profits had impacts on employment and prospects of workplaces across the globe (International Labour Organisation, 2020). Lack of operational online learning platforms and educational resources, and a general decline in the quality of training caused challenges among learners and teachers and, together with rising economic hardship, increased the likelihood of people dropping out of education. (UNESCO, 2020) The COVID-19 crisis has highlighted the fact that effective online learning platforms and the quality of pedagogical resources to support remote instruction are generally lacking in TVET systems, especially when they need to be deployed on a national scale, disruption of work-based learning due to the closure of enterprises across all regions of the world. Employers all over the world seek to employ a workforce with employability skills which can be attained by the effective collaboration between public-private partnerships in the provision of resources that will facilitate the development of a workforce with employability skills. However, TVET institutions in Nigeria continue to struggle with the attainment of their goals and objectives of contributing to Nigeria's skilled workforce development. This is attributed to online platforms not being fully integrated with regular programming, their quality and capacity are not adequately monitored, hindering a smooth transition to a mainly remote mode of learning. In this respect, International Labour Organisation (2021), suggests that public and private stakeholders in TVET need to promptly forge partnerships to increase the availability of accessible virtual learning solutions, develop new training programs that fit TVET programs and allocate additional resources for enhancing employability skills. Full use should be made of contemporary technology tools, particularly the Internet, interactive multimedia materials, audiovisual aids and mass media, to enhance the reach, cost-effectiveness, quality and richness of programs, especially in the promotion of self-learning.

Purpose of the study

The main purpose of the study is to find out the roles of public-private-partnership for improving TVET delivery in the era of the COVID-19 Pandemic in the southwest, Nigeria. Specifically, the study sought to determine the:

1. Training resources are required for the effective delivery of TVET programs to develop the employability skills of graduates during and after a post-COVID-19 Pandemic.
2. Private sector's innovative roles in improving training resources for effective TVET delivery towards developing employability skills during and post COVID-19 Pandemic.
3. TVET institution's roles enhance effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic

Research questions

1. What are the training resources are required for the effective delivery of TVET programs to develop the employability skills of graduates during and after a post-COVID-19 Pandemic?
2. What are the private sector's innovative roles in improving training resources for effective TVET delivery towards developing employability skills during and post COVID-19 Pandemic?
3. What are the TVET institution's roles in enhancing effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic?

Hypotheses

H_{01}: There is no significant difference between the mean rating of the private sector and TVET institutions regarding innovative training resources required for effective delivery of TVET programs to develop employability skills of graduates during and post COVID-19 Pandemic.

H_{02}: There is no significant difference between the mean rating of the managers and TVET Lecturers vis-a-vis the private sector's innovative roles in improving effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic.

H_{03}: There is no significant difference between the mean rating of male and female TVET lecturers concerning TVET institutions' innovative roles in enhancing effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic.

Methodology

The study adopted a survey research design. According to Nworgu (2015), it is one in which a group of people or items are studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. The study was carried out in the South-West, Nigeria with a population of 157 comprised of all TVET lecturers in the public institutions offering TVET programs and human resource development managers in 56 organised private sectors. The number was manageable hence, there was no sampling. The instrument used was an 18 item structured questionnaire in Likert type rating of, Strongly Agreed (SA), Agreed (A), Undecided (UD), Disagreed (D) and Strongly Disagreed (SD) with numerical values of 5, 4, 3, 2, and1 respectively. The instrument was validated by three experts and the reliability of the instrument was determined using the Cronbach Alpha reliability coefficient method which yielded 0.76. This being in line with Uzoagulu (2012) who noted that a reliability coefficient above 0.6 indicates that the instrument is reliable. Out of 157 copies of the questionnaire distributed, only 139 copies were returned giving an 88.54% return rate. Data collected were analyzed using mean and standard deviation. A t-test was used to test the null hypotheses at 0.05 level of significance using SPSS version 16. Standard deviation was used to determine the homogeneity or otherwise of the opinions of the respondents. For the t-test statistics, the t-test result was compared with the significant value (using SPSS) at 0.05 level of significance. The null hypothesis was not rejected where the significant value was less than the 0.05 significance level, otherwise, it was rejected.

Results

Table 1(a): Mean and Standard Deviation of Respondents' Responses on Innovative Training Resources Required for Effective Delivery of TVET Programs to Develop Employability Skill of Graduates During and Post COVID-19 Pandemic (N=139)

S/N	Item Statement	Mean	SD	Remarks
1	Provision of internet facilities in educational institutions	4.11	0.87	Required
2	Provision of alternative energy to power technology tools	4.31	0.62	Required
3	Educational radio and television broadcast for teaching	4.05	0.82	Required
4	Computer-based media	4.52	0.58	Required
5	Telephone	4.27	0.45	Required
6	Interactive multimedia materials	4.37	0.56	Required
7	Audiovisual and mass media	4.43	0.49	Required
8	Different software	4.33	0.69	Required
9	Online library facilities for students and teachers	4.17	0.87	Required
10	Provision of projectors for training	4.25	0.83	Required
11	Provision of film strips for teaching	4.10	0.09	Required
12	Making CCTV available for TVET programs	4.33	0.69	Required
13	Supply of Disc player	4.17	0.87	Required
14	Making digital textbooks available for training	4.25	0.83	Required
	Overall	**4.28**	**0.41**	

Results presented in Table 1(a), revealed that the mean responses of managers in private sectors and lecturers in TVE institutions regarding innovative training resources required for effective delivery of TVET programs to develop employability skills of graduates during and post COVID-19 Pandemic. Mean scores of the items show that respondents agreed that all the identified training resources are required for effective delivery of TVET programs. These training include: the provision of internet facilities in educational institutions; alternative energy to power technology tools; educational radio and television broadcast; computer-based media. Online library; projectors; CCTV; interactive multimedia and digital textbook. With the mean value ranging from 4.11 to 4.52 above the cut-off point of 3.50. it indicated that the respondents consider the provision of training resources as essential to the development of employability skills of graduates.

Table 1(b): t-test Analysis of Respondents' Responses on the Teachers' on Innovative Training Resources Required for Effective Delivery of TVET Programs to Develop Employability Skill of Graduates During and Post COVID-19 Pandemic

Group	N	$\bar{X}$	SD	Df	t-cal.	p-value	Decision
Managers	42	4.36	0.56				
				138	0.333	0.741	Not Significant
TVET Lecturers	97	4.51	0.58				

As revealed in Table 1(b), TVET lecturers had a relatively higher mean score of 4.51 than managers in private sectors with a mean of 4.36 concerning the innovative training resources required for effective delivery of TVET programs to develop employability skills of graduates during and post COVID-19 Pandemic. There was no statistically significant difference between TVET lecturers and managers in private sectors' mean score on innovative training resources required for effective development employability skill of graduates ($t= 0.333$ $r > 0.05$).

Table 2(a): Mean and Standard Deviation of Respondents' Responses on Private Sector's Innovative Roles in Improving Training Resources for Effective TVET Delivery Towards Developing Employability Skills During and Post COVID-19 Pandemic (N=139)

S/N	Item Statement	Mean	SD	Remarks
1	Private sectors co-joined with TVET institutions to draft curricula and courses of study to meet employers' demand	4.28	0.46	Agreed
2	Provision of general physical and institutional TVET infrastructure for the development of employability skills.	4.33	0.47	Agreed
3	Private cooperate with institutions for human resource development through high-technology education	4.48	0.50	Agreed
4	The NUC and NBTE provide key expertise, knowledge and skillsets for certification of training and the provision of academic awards to students on graduation	4.59	0.49	Agreed
5	Enterprises should be actively involved in the theoretical and practical training of those preparing for occupations in their particular sector	4.33	0.47	Agreed
6	Creation of joint facilities for research, development of prototype materials and equipment, and preparation of staff for the training of teachers	4.64	0.47	Agreed
7	Private sectors foster investment in training and enhance these resources through training funds, various incentives for training and learning, e.g. tax rebates, training credits	4.55	0.48	Agreed
8	Recognise various responsibilities for investment and enhance employability of TVET graduates, thereby address the economic challenges	4.46	0.50	Agreed
9	Trade unions and employer associations contribute to training by managing their training institutions and provides internships for students	4.22	0.42	Agreed
10	Help mobilise resources for programs to secure basic literacy and numeracy and the development of communication and information infrastructure	4.47	0.50	Agreed
11	Private enterprises should be encouraged to make their equipment and facilities available for practical training	4.36	0.69	Agreed
	Overall Mean	**4.43**	**0.69**	

Table 2(a) presents the mean and standard deviation of TVET lecturers and managers on innovative roles in improving training resources for effective TVET delivery towards developing employability skills during and post COVID-19 Pandemic. The mean score for each private-sector innovative role ranges from 4.22 and 4.59 indicated that private sectors roles are essential in improving training resources for effective delivery of TVET towards developing employability skills among graduates. Among which include: Private sectors co-joined with TVET institutions to draft curricula and courses of study to meet employers' demand; provision of general physical and institutional TVET infrastructure for the development of employability skills; creation of joint facilities for research, development of prototype materials and equipment, and preparation of staff for the training of teachers; help mobilise resources for programs to secure basic literacy and numeracy and the development of communication and information infrastructure, and private sectors foster investment in training and increase resources for training through training funds, various incentives for training and learning, e.g. tax rebates, training credits

Table 2(b): t-test Analysis of Respondents' Responses on Private Sector's Innovative Roles in Improving Training Resources for for Effective TVET Delivery Towards Developing Employability Skills During and Post COVID-19 Pandemic

Group	N	$\bar{X}$	SD	Df	t-cal.	p-value	Decision
Managers	42	4.45	0.47				
				138	0.683	0.503	Not Significant
TVET Lecturers	97	4.56	0.69				

An independent sample t-test was employed to compare the mean score of managers in private sectors and lecturers in TVET institutions regarding private sectors innovative roles in improving training resources for effective delivery of TVET programs towards developing employability skills of graduates during and post COVID-19 Pandemic. As shown in Table 2(b), respondents in private sectors had a mean score of 4.45 lower compare to TVET lecturers with a mean score of 4.56. However, there was no statistically significant difference between lecturers in TVET institutions and managers in private sectors mean score on private sector's innovative roles in improving training resources for effective delivery of TVET programs towards developing employability skills of graduates (t=0.683, > r 0.05).

Table 3(a): Mean and Standard Deviation of Respondents' Responses on TVET Institutions' Roles in Improving Training Resources for Effective TVET Delivery Towards Developing Employability Skills During and Post COVID-19 Pandemic (N=97)

S/N	Item Statement	Mean	SD	Remarks
1	Training institutions responsible for the pedagogical aspect of teacher preparation employ experienced teachers in TVET and possess qualifications in the occupational area.	4.34	0.63	Agreed
2	Workshops and laboratories in TVET institutions are used to instil the culture of maintenance and respect for safety standards	4.51	0.50	Agreed
3	TVET courses emphasise on safe and environmentally sound procedures relative to the equipment used in the workplace.	4.59	0.49	Agreed
4	Managers responsible for the preparation of TVET teachers should be actively engaged in technical research and analyses of work opportunities in their occupational areas.	4.34	0.47	Agreed
5	TVET institutions support for professional growth through flexibility in administration and curriculum design.	4.39	0.63	Agreed
6	TVET institutions make greater efforts to invest in ICT and develop ICT-appropriate methods of teaching rather than simply adding computers to existing teaching methods	4.53	0.49	Agreed
7	permit the updating and renewal of knowledge and practical abilities and skills in the occupational field	4.46	0.50	Agreed
8	TVET ensure that all necessary information concerning the world of work and career opportunities is available, and actively disseminated using all available forms of communication.	4.28	0.45	Agreed
9	Machinery and equipment in TVET institutions and simulates the needs of the workplace as closely as possible.	4.43	0.49	Agreed
10	Classroom management, special teaching methods appropriate to the subjects/fields of the future teachers and methods of evaluating the students' work be adopted.	4.35	.048	Agreed
	Overall Mean	**4.13**	**1.05**	

Table 3(a) present the mean and standard deviation of managers in private sectors and TVET lecturers on TVET Institutions' roles to enhance effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic. A close look at the mean score of each item shows that respondents agreed with all the TVET institutions roles in developing employability skills of graduates. Among which includes: workshops and laboratories in educational institutions are used to instil the culture of maintenance and respect for safety standards; managers responsible for the preparation of TVE teachers should be actively engaged in technical research and analysis of work opportunities in their occupational areas; machines and equipment used in workshops in TVET institutions be geared to the needs of the workplace and should stimulate it as closely as possible, and TVET institutions make greater efforts to invest in ICT and develop ICT-appropriate methods of teaching rather than simply adding computers to existing teaching methods. The items on the scale had mean values ranging from 4.28 to 4.69 which is above the cut-off point of 3.50.

Table 3(b): Independent Samples t-test Statistics of Mean Responses of Respondents Regarding TVET Institution's Roles Enhance Effective Developing Employability Skills of Graduates During and Post COVID-19 Pandemic (N=97)

Table 3(b): t-test Analysis of Respondents' Responses on TVET Institutions' Roles in Improving Training Resources for for Effective TVET Delivery Towards Developing Employability Skills During and Post COVID-19 Pandemic

Group	N	$\bar{X}$	SD	Df	t-cal.	p-value	Decision
Managers	22	4.12	0.49				
				138	0.596	0.401	Not Significant
TVET Lecturers	75	4.45	0.50				

To determine gender differences regarding TVET institutions' role towards effective development of employability skills of their graduate during and after the post-COVID-19 Pandemic, an independent sample t-test was conducted to compare the mean score of female and male TVET lecturers. The independent sample t-test scores were presented in Table 3b. As seen in Table 3b, male lecturers had relatively mean scores than female lecturers. However, this difference in their mean score was not statistically significant between the female and male lecturers on TVET institution's role towards enhancing effective developing employability skills of their graduates during and post-COVID-19 Pandemic ($t= 0.596$, $r> 0.05$).

Findings

1. Training resources required for effective TVET delivery included: provision of internet facilities in educational institutions; alternative energy to power technology tools; educational radio and television broadcast; computer-based media. Online library; projectors; CCTV; interactive multimedia and digital textbook.
2. The private sector's innovative roles needed in improving training resources for effective TVET delivery involved: partnership with TVET institutions to collectively drafted curricula and courses of study, which are designed to meet skill demand from graduates. This will lessen the mismatches between the outcomes of the technology education programs and the demands of the labour market.
3. Roles of TVET institutions in enhancing effective TVET delivery included: collectively drafted curricula and courses of study, which are designed to meet the demand of clients. This partnership has been developed to lessen the mismatches between the outcomes of the technical education system and the demands of the labour market.

Discussion

The first research question and null hypothesis sought to find out if significant differences exist between responses of managers in the private sector and TVET lecturers regarding innovative training resources required for effective delivery of TVET programs to develop employability skills of graduates during and post COVID-19 Pandemic. Consequently, the null hypothesis was accepted (t=.333 r > .05). It was concluded that no significant difference between the mean responses of managers in the private sector and TVET lecturers regarding innovative training resources required. The findings in respect of hypothesis supportd UNESCO & ILO (2020) who emphasised that training resources such as broadcasting radio and television, online learning resources, digital infrastructures, data accessibility for institutions, a multimedia library and suitable learning environments are essential to support quality TVET programs that prepare young people with the employability skills they need to succeed at work. Furthermore, Virgina (2020) stressed that TVET institutions require support for low-tech, offline resources that can be easily facilitated by teachers and institutions that will offer students the best opportunity to develop the skills, knowledge and experiences they need to be employable.

The second research hypothesis sought if a difference exists between mean responses of managers in the private sector and TVET lecturers vis-a-vis the private sector's innovative roles in improving effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic was accepted (t=.683, > r.05). The findings in respect to hypothesis two agreed with the finding of previous studies of Virgina (2020) and IIEP-UNESCO (2020) declare that TVET institutions need to create a bigger role for private sectors (employers) in supporting skills development through improving the connectivity of teachers and students; support teachers and instructors to adapt pedagogies and develop new teaching and learning tools. Furthermore, the findings are in agreement with UNESCO- UNEVOC (2016) that stressed that the private sector can help identify demand for skills, feed into curricula development, deliver monitoring and evaluation activities, as well as managing public training institutions. Also, IIEP-UNESCO (2020) and Mohamed (2021) observed that offering guest workshops (online, across radio channels, or even by sharing short videos via WhatsApp), worksite visits (when it becomes possible), mentoring and curriculum support, will bring much greater alignment between the young people emerging from TVET institutions and the kinds of skills and experiences sought for in recruits. This will likely have to be a joint and proactive effort from the government and the international education and NGO community to ensure educators are adequately trained. UNESCO & ILO (2012) stressed further that workers' employability can only be sustained in an economic environment that promotes job growth and rewards individual and collective investments in human resources training and development. TVET institutions in Nigeria will require leadership, new partnerships and investment to continue supporting effective learning.

The t-test analysis between mean responses of managers in the private sector and TVET lecturers concerning TVET institution's innovative roles in enhancing effective TVET delivery towards developing employability skills of graduates during and post COVID-19 Pandemic did not differ significantly, hence the third hypothesis was accepted (t=.596, r>.05). The findings in respect to hypothesis three agreed with the findings of Thompson (2016); Virgina (2020) ILO-UNECSO (2020) that observed that TVET lecturers will need support and training to ensure they can adapt and offer quality and effective teaching and learning and this will facilitate and encourage self-directed learning and peer-to-peer learning that produce a better learning experience, learning outcomes and promote more independence, reflection and self-evaluation. Furthermore, the findings are in agreement with Robert (2020) and Stephen (2012) who encourage lecturers and instructors to find and adopt new learning environments, where students should be given the confidence to take ownership of their education and to learn wherever they are. Students can use their enterprise skills to develop new business ideas. This resourceful approach to learning according to Robert also has major benefits in terms of developing applied personal skills including problem-solving, teamwork, taking the initiative and critical thinking, all of which are critical to developing their employability skills.

Conclusion

Based on the findings of the study; the conclusion was made that innovative training resources are essential for effective delivery of TVET programs to develop employability skills of graduates during and post COVID-19 Pandemic among others are the provision of internet facilities in educational institutions; alternative energy to power technology tools; educational radio and television broadcast; computer-based media. Online library; projectors; CCTV; interactive multimedia and digital textbook. TVET institutions require partnership with private sectors (employers) to assists in employability skills development through improving the connectivity of teachers and students; support teachers and instructors to adapt pedagogies and develop new teaching and learning tools, identify demand for skills, feed into curricula development, deliver monitoring and evaluation activities, as well as managing public training institutions. TVET lecturers should find and adopt new pedagogies learning environments, where students should be given the confidence to take ownership of their education and to learn wherever they are and TVET lecturers should be actively engaged in technical research and analyses of work opportunities in their field.

Recommendations

1. Private sectors should partner with TVET institutions to make provision for innovative training resources such as internet connectivity, data for students, online educational resources and others that are essential for developing employability skills.
2. Private sectors should be made involve in the training of TVET graduates by identifying demand for skills, feed into curricula development, deliver monitoring and evaluation activities, facilitating and guiding learning and support students' socioemotional development.
3. TVET lecturers should ensure that they offer quality and effective teaching and learning that will facilitate and encourage self-directed learning that produces a better learning experience, learning outcomes and promote the development of employability skills.

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IMPROVING ELECTRICAL/ELECTRONIC STUDENTS' SKILLS ACQUISITION IN THE POLYTECHNICS IN OYO STATE THROUGH COLLABORATION WITH THE INDUSTRY FOR SUSTAINABLE DEVELOPMENT IN THE ERA OF COVID-19

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Abstract: *The study was focused on improvement of Electrical/ Electronic students' skills, acquisition in the Polytechnics through school-industry collaboration for sustainable development in the advent of COVID-19. Descriptive survey research design was employed for the study. Three research questions were raised for the study. The population for the study was two hundred (200) of the respondents which comprises of one hundred (100) for Polytechnics instructors and one hundred (100) for Electrical and Electronic Technology Industries Managers within Oyo State, Nigeria especially where electrical/electronic industries are surfaced. Multi sampling techniques was used for the study to allow and ensure the full participation of the respondents before harvesting their responses in the questionnaire for data processing. There was no sample for the study because of small size in population.The instrument for the data collection was questionnaire tagged:Improving Electrical/Electronic Students' Skills Acquisition in the Polytechnics through Industrial Collaboration for Sustainable Development in the era of COVID -19, Oyo State Questionnaire (IEESSAPICSD) was used for the data collection. The questionnaire was validated by three experts in Electrical and Electronic technology education unit of Technical Education, Department of Emmanuel Alayande College of Education, Oyo, Oyo State using content validity to ensure the items contains all the subjects matter in the questionnaire. Test-retest method was conducted in Ogun State's Polytechnics as a pilot study at an interval of two weeks. To determine reliability of the instrument Pearson Moment Correlation Coefficient was used to obtain 0.70 reliability coefficients indicating that the instrument is reliable for the study. Mean valueand Standard Deviation were used to answer the three research questions at a cutoff points above 3.00 and 0.75 as Highly Needed (HN) while below 3.00 and 0.75 as Not Needed (NN) for mean value and standard deviation for the data analysis. Findings from the focus areas revealed, among others. that the instructional facilities and the modalities were highly needed for the students skills acquisition though industrial collaboration. It was therefore, recommended that parents of the students in Polytechnics should encourage their wards' participation in academic activities during COVID-19 Pandemic to avoid being involved idleness and loss of academic pursuit.*

Keywords: *Skills Acquisition, School-Industry Collaboration, Sustainable Development, COVID-19*

Introduction

Polytechnic are tertiary institution of higher learning saddled with responsibility of training higher and middle level manpower such as higher technologies, technicians, artesian, craftsmen and others for utilization of industries, organization, co-operate bodies and to be self- reliance upon the graduation of students. In polytechnic several programmes are offered for the students among which are Building, Automobile, Woodwork, Electrical/Electronic technology and host others in accordance to Federal Republic of Nigeria (2013). Therefore, Electrical/Electronic Technology is an integral part of Vocational Technical Education and Training required to offer students with courses to such as introduction to Electrical/ Electronic, Electrical and Electronic Devices, Electrical and Electronic Draining and host of others which is in accordance with National Board for Technical Education (2020) The goals and objectives of Polytechnic institutions are pursued through two tiers of programme namely National Diploma (ND) which is a two year programme along with one year of Students Industrial Work Experience Scheme (SIWES). The SIWES programme having acquired would serve as a pre-requisite for gaining admission into the second Higher National Diploma (HND) programme which serves as an interaction to industrial collaboration between Polytechnics and industries for the student to acquire the necessary skills that can enhance further the skills already acquire from Polytechnics. National Council on Skills Development (2010) stressed that skills acquisition has potential of being utilized for generating income and gainful employment.

The mandate of Polytechnic institutions however includesteaching, Research and Skills impartation tostudents'skills' acquisitionleading to contributing to the Community Development (National Board for Technical Education (2013). In view of this, Skills acquisition in tertiary institutions according to Adedeji (2020) is described as education, training and development activities designed to help the trainees to gainful knowledge, and attitudes in the focus area that would help in improving their performance in a chosen career or positions currently occupying which may determine their future prospects in a society. This however, supported by the study of Alao, *et al.,* (2019) on the basis of requiring a length of time or period before the goals can be achieved. In trying to achieve this laudable goals, the need for collaboration between Electrical and Electronic Industries and Polytechnic would do a lot of impartation to bridge the gap between theory and practical as many of the institutions don't have adequate of instructional facilities, materials, modern tools and equipment that can provide competitiveness with that of Electrical and Electronic industries(Idris & Rajuddin, 2012). Consequence upon the lacking of modern instructional facilities and in addition to the ravaging effects of COVID-19, Nigeria was compelled to adopt measures of stay-at-home leading to temporary suspension of all academic activities to contain and forestall the spread of the virus however are affecting directly to the enjoined needs for collaboration between Polytechnics and Electrical and Electronic Technology Industries in Oyo State and Nigeria in particular calls for immediate attention.

Electrical and Electronic Technology Industries are public organizations or establishments for the production of wires and cables, equipment and other which includes radio set television set, hand set, electric cookers and a host of others Electrical/Electronic devices or components such as diodes, transistors, resistors, cathodes, capacitors, for consumptions and commercial activities by the business men (Ibe, 2009).All these among others required skills on safety precaution training that needs constant practicesand probably handling of the production of electrical and electronic products to be achieved through collaboration. Therefore, Idris and Rajuddin (2012) reported that the skillsrequired for employment particularly on safety in industries cannot be provided by the institutions alone simply because the equipment and tools in the school workshops are not up to the standards of industries for the implementation and actualizing the skills required by students in industries and where they are available, they are obsolete and outdated. This necessitates for the introduction and inclusion of SIWES through Industrial Training Fund (ITF) in an effort to bridge the gap between theory and practice, but the results are not satisfactory enough to cater foe the society needs due to COVID-19 among others(Industrial Training Fund, 2011). The need for improving students' skills through industrial collaboration, partnership or synergy in Polytechnics in Oyo State during COVID-19 era becomes imperative. According to Helmy, *et al.,* (2020) describe COVID-19 as disease capable of being transmitted between humans being through direct contact, aerosol droplets and fecal or oral routes. Also, that its potency has since affected no fewer than 200 countries with 43,031,439 cases and 1,156,034 reported deaths which was not excepted Nigeria with few cases of 61,930 while the figure of death were rated to be 1,129. Consequence upon this prevailing situation, the Federal Government of Nigeria declared either partial or full total lockdown to major cities which inversely affected not just socioeconomic life of the people but also resulted to the total closure of almost all academic activities at all level of education for over more than five months. The existing collaboration between Polytechnics and Industries should not be hinderedto keep the economy going. Collaboration is often used interchangeably with Synergy or partnership which involves co-operation, work or act together between people or organizations in the public or private sector for the purpose of mutual benefit. The partners must have agreed to set up and manage a business outfit with the sole aim of making profit, having the same common interest, objectives and goals (Ande, 2012). Therefore, synergizing in the area of skills andsafety precaution training would enhance students' performance required for the job performance in industries and self-sustainability and development. Sustainable development has been described as the ability of an individual, household or community to be able to meet the social basic needs (Idrils, *et al.,* 2020). All these among others can only be achieved through interacting collaboration between Polytechnics and Electrical and Electronic Industries activities that would be helping in providing skills for the students upon graduation.

Statement of the problem

Skills acquisition is one of the first priority for the students to acquire in tertiary institutions of higher learning as this would enable students to contribute their quota to the development and needs of the society and more importantly, driving the economics of nation and to be self –reliance instead of seeking for white collar jobs.Skills acquisition in all field of endeavour required a length of training which has notexempted graduates of Electrical/ Electronic technology. Therefore, with this present of prevailing and ravaging of COVID-19 pestering the life of common Nigerians and leading to dwindling economic of individual, society and the nation at large. Here, students may indulge in social vices since schools have complied to COVID-19 prevention and control put in place by government. However, the Polytechnics institutions alone cannot provide and handle all that are cost involving skills acquisition development for the students becauseof inadequate of modern tools, equipment and machines in schools workshops as compared to and with industries that are far reach in use, and where such available are rather outdated and obsolete to withstand the current dispensation. Also, the introduction of Students' Industrial Works Experience Scheme (SIWES) for the polytechnics' programmes of students in schools seems not to be yielding fruitful results and coupled with this era of COVID-19 preventing the existing cordial interaction and relations between students on Industrial and managers of industries resulting to many graduates to be under poorly performing in skills development at period COVID-19 era. This and many may not be the reasons that there are not enough solid SIWES guidelines for and to facilitate thoughtful industrial collaboration for Polytechnics at ensuringand guaranty inadequate training for the students in order to bridge the gaps between theories and practicaland where such available are not properly implemented for the outcomes to be the results and more so that COVID-19 deadly has hindered full interaction existing industries and Polytechnics. Hence, the need for improving electrical/electronic students' skills acquisition in the polytechnics through industrial collaboration especially in this era of COVID-19 for sustainable development in Oyo State is imperative and deserving.

Purpose of the study

The main purpose of the study is to determinetheImprovement of electrical/electronic students' skills acquisition in the polytechnics through industrial collaboration for sustainable development in the era of COVID -19, Oyo State. Specifically,the study sought to:-

1. Determine the focus areas of electrical/electronic students 'skills acquisitionrequired through industrial collaboration in Polytechnics for sustainable development in the era of COVID-19.
2. Examine the adequate instructional facilities required by the electrical/electronic students for skills acquisition that would facilitate industrial collaboration inPolytechnicsfor sustainable development in the era of COVID-19.
3. Find out the modality set aside for electrical/electronic students skills acquisition throughindustrialcollaboration in Polytechnic for sustainable development in the era of COVID-19.

Research questions

1. What are the focus areas of electrical/electronic students 'skills acquisition required in Polytechnics throughindustrialcollaboration for sustainable developmentin the era of COVID-19?
2. Are there adequate instructional facilities required by the electrical/electronic students'skills acquisitionin Polytechnics throughindustrialcollaboration for sustainable developmentin the era of COVID-19?

3 Are there any modalities set-aside for electrical/electronic students' skills acquisitionin Polytechnics through industrial collaboration for sustainable developmentin the era of COVID-19?

Methodology

Descriptive survey research design was adopted for the study. This is because the items of the questionnaire seek the views, opinions and information of the respondentsbased on the items of questionnaire for data collection. Three research questions were raised for the study. The population for the study was two hundred (200) of the respondents which comprises of one hundred (100) of Polytechnics instructors and one hundred (100)of Electrical and Electronic Technology Industries ManagerswithinOyo State, Nigeria especially where electrical/electronic industries are surfaced. Multi sampling techniques was used for the study to allow and ensure the full participation of the respondents before harvesting their responses in the questionnaire for data processing. There was no sample for the study because of the small size in population. The instrument for the study was questionnaire tagged: Improving Electrical/Electronic Students' Skills Acquisition in Polytechnics through Industrial Collaboration for Sustainable Development in the Era of COVID-19 inOyo StateQuestionnaire(IEESSAPICSD) was used for thedata collection. The questionnaire was validated by three experts in Electrical and Electronic technology education unit of Technical Education, Department of Emmanuel Alayande College of Education, Oyo, Oyo State using content validityto ensure the items contains all the subjects matter in the questionnaire. Test-retest method was conducted in OgunState's Polytechnics as a pilot study at an interval of two weeks. To determine reliability of the instrument Pearson Moment Correlation Coefficient was usedto obtain 0.70 reliability coefficients indicating that the instrument is reliable for the study. Mean value and Standard Deviation were used to answer the three research questions at a cutoff point above 3.00and 0.75 as Highly Needed (HN) while below 3.00 and 0.75 as Not Needed (NN) for mean value andstandard deviation for the data analyses.

Results

Table 1: Mean and Standard Deviation of Respondents on the Electrical/ Electronic Students' Skills Acquisition Required in the Polytechnics in Oyo State through Industrial Collaboration for Sustainable Development in the Era of COVID-19

S/N	Item Statement	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_A$	SD_A	Remarks
1.	Improve on students' trouble shooting skills of Electrical and Electronic gadgets faulty in Polytechnics through the use of virtual or zooming application methodof industrial collaboration for sustainable development in the era of COVID-19	3.80	0.78	3.76	0.75	3.63	0.77	HN
2.	Improve students' assemblage skills of electrical and electronic gadgets in Polytechnicthrough the use of virtual zooming application method of industrial collaboration in Polytechnics for sustainable development in the era of COVID-19	3.54	0.77	3.50	0.80	3.70	0.74	HN
3.	Improve students' soldering skills of Electrical and Electronic gadgets' components in Polytechnicthrough the use of virtual or zooming application method of industrial collaboration for sustainable development in the era of COVID-19	3.56	0.75	3.60	0.76	3.58	0.76	HN

S/N	Item Statement	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_A$	SD_A	Remarks
4.	Improve students' removing skills of Electrical and Electronic gadgets' components faulty in Polytechnics through the use ofvirtual or zooming application method of industrial collaboration for sustainable development in the era of COVID-19	3.75	0.75	3.80	0.78	3.78	0.77	HN
5.	Improve students' crosschecking skills of Electrical/Electronic gadgets in Polytechnics through the use of virtual or zooming application method of industrial collaboration	3.78	0.80	3.65	0.73	3.72	0.77	HN
6.	Improve students'reading of the meter skills on appropriate values of Electrical and Electronic components in Polytechnic through the use virtual or zooming application method of industrial collaboration for sustainable development in the era of COVID-19	3.56	0.75	3.58	0.78	3.57	0.76	HN
7.	Improve students' method of soldering Electrical and Electronic gadgets componentswithout being cool in Polytechnics through the use of virtual or zooming application method of industrial collaboration for sustainable development in the era of COVID-19	3.65	0.75	3.57	0.77	3.61	0.76	HN
8.	Improve students' testing skills method of Electrical and Electronic gadgets components in Polytechnics through the use of virtual or zooming application method of industrial collaboration for sustainable development in the era of COVID-19	3.60	0.76	3.65	0.78	3.63	0.77	HN

Where: $\bar{X}_1$= Mean Value for Polytechnics' Instructors, SD_1= Standard Deviation for Polytechnics' Instructors, $\bar{X}_2$= Mean Value for Electrical/Electronic Industries' Managers, SD_2= Standard Deviation for Electrical/Electronic Industries' Managers, $\bar{X}_A$= Mean Value for All the Respondents, SD_A= Standard Deviation for All the Respondents; HN= Highly Needed and NN=Not Needed.

In Table 1, it was seen from the responses of the respondents that the high average mean value and standard deviation were ranged between 3.78 and 0.77 on item 4 while the lower average mean and standard deviation were ranging between 3.57 and 0.76 on item 6 indicating that any of the values were meeting the cut off of 3.00 and 0.75 of mean value and standard deviation as all the items specified for the focus areas were needed for the electrical/electronic students' skills acquisition in Polytechnics through industrial collaboration for sustainable development in the era of COVID-19.

Table 2: Mean and Standard Deviation of Respondents on Adequate Instructional Facilities Required in the Polytechnics in Oyo State for Electrical/Electronic Students' Skills Acquisition Through Industrial Collaboration for Sustainable Development in the Era of COVID-19

S/N	Item Statement	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_A$	SD_A	Remarks
1.	Provision of modern Electrical and Electronic tools through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19	3.50	0.75	3.55	0.82	3.53	0.79	HN
2.	Provision of modern Electrical and Electronic equipment through the useof virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19	3.58	0.76	3.65	0.79	3.62	0.73	HN
3.	Provision of modern Electrical and Electronic machines through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19.	3.55	0.75	3.58	0.76	3.57	0.76	HN
4.	Provision of adequate supply of electricity through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19.	3.59	0.78	3.54	0.78	3.57	0.78	HN
5.	Provision of workbench through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19 .	3.58	0.77	3.55	0.75	3.57	0.76	HN
6.	Provision of stood through the use of virtual or zoom application method of industrial collaboration in Polytechnic for the students.	3.60	0.80	3.57	0.78	3.59	0.76	HN
7.	Provision of fire prevention through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19	3.54	0.78	3.54	0.75	3.54	0.77	HN
8.	Provision of first aid boxes through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19	3.50	0.70	3.52	0.73	3.51	0.73	HN

S/N	Item Statement	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_A$	SD_A	Remarks
9.	Provision of instructional safety guide lines through the use of virtual applications for industrial collaboration in Polytechnic for sustainable development in the era of COVID-19	3.52	0.74	3.55	0.75	3.54	0.75	HN
10	Provision of workshops through the use of virtual or zoom application method of industrial collaboration in Polytechnic for sustainable development in the era of COVID-19	3.80	0.80	3.75	078	3.78	0.79	HN

Where: $\bar{X}_1$= Mean Value for Polytechnics' Instructors, SD_1= Standard Deviation for Polytechnics' Instructors, $\bar{X}_2$= Mean Value for Electrical/Electronic Industries' Managers, SD_2= Standard Deviation for Electrical/Electronic Industries' Managers, $\bar{X}_A$= Mean Value for All the Respondents, SD_A= Standard Deviation for All the Respondents; HN= Highly Needed and NN=Not Needed

In the Table 2 it was seen from the responses of the respondents that high average mean and standard deviation were ranged between 3.78 and 0.79 of item 18 while the lower average mean and standard deviation were ranging between 3.51 and 0.73 on item 16 resulting to meet up the cut off points of mean and standard deviation values as all items were highly needed for adequate instructional facilities required by the electrical/electronic students' skills acquisition in Polytechnics through industrial collaboration for sustainable development in the era of COVID-19.

Table 3: Mean and Standard Deviation of Respondents on Modalities for Electrical/Electronic Students' Skills Acquisition in the Polytechnic in Oyo State through Industrial Collaboration for Sustainable Development in the Era of COVID-19

S/N	Item Statement	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_A$	SD_A	Remarks
1.	Maintaining a good distance to each other while together	3.58	0.77	3.60	0.75	3.58	0.76	HN
2.	Using face mask while with each other while together	3.65	0.76	3.55	0.76	3.60	0.76	HN
3.	Using sanitizer to rub off the two hands before and after being while together	3.57	0.78	3.80	0.80	3.69	0.79	HN
4.	Using water soap to wash the two hands always before entering and after the workshops practical.	3.65	0.76	3.75	0.78	3.70	0.77	HN

Where: $\bar{X}_1$= Mean Value for Polytechnics' Instructors, SD_1= Standard Deviation for Polytechnics' Instructors, $\bar{X}_2$= Mean Value for Electrical/Electronic Industries' Managers, SD_2= Standard Deviation for Electrical/Electronic Industries' Managers, $\bar{X}_A$= Mean Value for All the Respondents, SD_A= Standard Deviation for All the Respondents; HN= Highly Needed and NN=Not Needed

In the Table 3 it was seen from the high average mean and standard deviation were ranged between 3.69 and 0.79 on item 21 while the lower average mean value and standard deviation were ranging between 3.58 and 0.76 respectively. The each of the average mean values and standard deviation were meeting the cut off points has specified as highly needed for the modalities set-aside for electrical/electronic students' skills acquisition in Polytechnic through industrial collaboration for sustainable development in the era of COVID-19.

Findings and discussion

The Table 1 revealed on the focus areas for the students skills acquisition were all highly needed by the students in the Polytechnics through industrial collaboration to contribute their quota to the society needs as this was substantiated by research study of Adedeji 2020 on strategies of improving electrical/electronic technology education skills acquisition in tertiary institutions: A pathway towards Security Intervention for Sustainable Development in Nigeria.

Table 2 on the above submission on the provision of instructional facilities require for the students acquisition of skills in the Polytechnics through industrial collaboration were all highly needed for the student practical as many of these modern facilities could not be provided by the Polytechnics alone while all these were toeing line with the research study of Idris & Rajuddin (2012) on the influence of teaching approaches among Technical and Vocational Education Teachers towards acquisition of technical skills in Kano StateNigeria.

Finally Table 3 on the response of the modalities set-aside for electrical/electronic students' skills in Polytechnics acquisition through industrial collaboration for sustainable developmentin the era of COVID-19 were all highly needed as being complied to the research study of Helmy, *et al.,* (2020) on the COVID-19 Pandemic: A comprehensive review of taxonomy, genetics, epidemiology, diagnosis, treatment and control.

Conclusion

The findings of the study revealed that students skills acquisition in the Polytechnics through industrial collaboration can be improved in spite of the fact that COVID-19 Pandemic were ravaging the academic activities in Oyo State and Nigeria in particular provided all the stringent measures were dully followed or abided by to the letterby both the students, Polytechnics instructors and managers of industries for the academic to progress.

Recommendations

1. The stringent measuresput in place be strictly adhered to and observed to the letter so as to afford the spreading of COVID-19 Pandemic deadly disease in our communities.
2. The parent of the students in Polytechnics should not discourage their wards from being participated from academic activities during COVID-19 Pandemic to avoid being involved in anti-socialactivities and lost a lot in academic pursuit at the era of COVID-19 Pandemic.
3. Government at both Federal and States should provide the drugs for the citizenries that would prevent the further spreading of deadly disease of Pandemic in our society.

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SUB-THEME 4

ENTREPRENEURSHIP IN TVET IN THE ERA OF COVID-19 PANDEMIC

IMPACT OF COVID-19 PANDEMIC ON BLOCK/BRICK MANUFACTURERS IN SHAMAKI/BAJOGA WARD OF GOMBE LOCAL GOVERNMENT AREA

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Abstract: *The study was carried out on the topic" Impact of COVID-19 Pandemic on Block/Brick Manufacturers in Shamaki/Bajoga ward of Gombe Metropolis: Entrepreneurship in TVET in the Era of COVID-19 Pandemic". The research design used was mixed-method (qualitative and Quantitative methods), two purposes and two research questions were formulated in order to guide the study. Area of the study was Shamaki/Bajoga ward of Gombe metropolis, the population covers all block/brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis which are 14 in number, the sample was 7 block/brick manufacturers selected at random. The instruments used for data collection were two; the first instrument was interview method which was used for collecting data for research question one which deals with qualitative aspect of the study. The second instrument was a structured questionnaire which was used to collect data for research question two which deals with the quantitative aspect of the study. For research question one, the responses were presented in tabular form, while for the research question two, mean was used to analyze the data collected and it was also presented in tabular form. The findings were itemized, discussed and recommendations were made.*

Keywords: *COVID-19, Block/Brick Manufacturers, Entrepreneurship*

Introduction

COVID-19 pandemic came to existence in the late 2019, the virus originated in China, home to most factories that supply finished products to various countries, and was declared as global pandemic on 11th March, 2020 by World Health Organization. Since then COVID-19 continued to spread across the world and made a lot of impacts on lives, properties and businesses of people. COVID-19 has killed millions, turns millions into beggars and destroys many businesses, closure of working place and made almost everything to stand-still. Among the impacts made by COVID-19 is shut down of schools, Skills Initiative for Africa (SIFA) (2020) explained that while closing education institutions are important in mitigating the spread of COVID-19, prolonged closures negatively impacted all students and disproportionately affect the deprived and vulnerable youth. A country like Nigeria is faced with a serious challenge of unemployment, that is; significant number of people in Nigeria sought and still seeking for job but could not get any. According to Igwe (2008), entrepreneurship education is the type of education that equips the citizen with the right training and motivation they need to be self-reliant and job creators thereby reducing unemployment to the beeriest minimum. According to Bassey & Archibong (2015), the goal of entrepreneurship education is to empower graduates, irrespective of their areas of academic specialization, with knowledge and skills that will enable them to create their own income generating ventures. Lidimma (2012) in Lemo & Olakotan (2017) described entrepreneur to be a giver of employment, provider of infrastructures and valuable services to the community. For one to be entrepreneur, there are some certain skills needed. Those skills are explained by Hayton (2015), who said entrepreneurial skill is defined as "identifying customer needs, technical or market opportunities, and pursuing opportunities". According to Kolo (2004) entrepreneurship skills acquisition could enable the student bridge the gap between the unemployed and the employed when the skills are properly imparted to them by the teachers. He stated that when students are equipped with entrepreneurial skills or made to exploit their potentials, they would be employed upon graduation. According to the studies of Henry, Hill, & Lecttch (2003) & Undiayaundeye (2015) entrepreneurs are identified as the engine of economic progression and the creation of wealth, and they are important the quality of life by providing employment opportunities for both the educated and less educated.

Entrepreneurial Skills in Building Technology

According to Frederick, Patacsil & Lourrine (2017) examples of entrepreneurial skills include; knowledge of and compliance with company practices and organization protocols, understanding and effective use of industry technology, knowledge of and compliance with industry legal requirements and knowledge and compliance with company products and standards. Thomas (2012) listed entrepreneurship skills to include; Inner Discipline, Ability to Take Risk, Innovative, Change-Orientated, and Persistence among others. Mitchelmore & Rowley (2013) proposed 6 necessary skills for successful entrepreneurs, thus; identification of viable market niche, Development of innovation products or services to the firm's market niche, Idea generation, Business environmental scanning, Envisioning and taking advantage of opportunities, and Formulating strategies for taking advantage of opportunities. Spinelli, Adams, and Timmons (2012) stated that; commitment and determination, leadership, opportunity obsession, tolerance of risk, creativity, and internal motivation are necessary for successful entrepreneurs.

Peter, Ahmid and Sherifat (2014) identified skills in building trade to include: carpentry/ woodwork/ joinery, block laying/concreting, painting and decoration, plumbing /pipe fitting, iron bending /welding, landscaping, and brick / block molding. Dauda & Muhammad (2019) express that the construction industry is full of opportunities which should and must be explored in order to make a change in the economic growth of the industry and the nation. And that these opportunities to explore will include; Aluminum work and installation, basement remodeling, concrete cutting, cabinet works, interior designing, landscaping, ceramic tiles sales and installation, chimney construction and repairs, construction estimating services, construction project management, dam construction and maintenance of irrigation, demolition services, drainage construction and repairs, dry wall installation, fence repairs, real estate development and guide, roof repairs and improvement, road construction, remodeling project management, scaffolding rentals, stair lift services, storage sheds and water proofing services. According to Ibrahim & Ma'aji (2011), Building technology is a cluster of trades in which skills oriented subjects can help an individual to become self – employed in areas such as Blockwork, brickwork, concreting, finishing, block molding, painting, plumbing and landscaping. Exposing students to the trades will provide them with skills that can make them highly productive and therefore, become employable in either paid or self – employment.

Statement of the problem

Unemployment has became epidemic in the whole world, particularly in a country like Nigeria. Today Nigeria is faced with a serious challenge of unemployment. That is, significant number of people in Nigeria sought and still seeking for job but could not get any. This situation of unemployment rendered youth into engaging in social vices. This was stated by Patrick (2019), who said unemployment has forced youth to engage in some criminal activities like; robbery, kidnapping, insurgency among others. With this situation on ground, Tunji (2019) proclaimed that the presidency and the Industrial Training Fund said that the federal government and its agencies could not provide jobs for all Nigerians. Consequently, researchers and other experts continued to make advocacy on engaging in entrepreneurship as a way forward. For example Oladele, Akeke & Oladunjoye (2011), entrepreneurship drives innovation and creativity, increases employment and meets demands. Obi and Okeke (2017) also expressed that entrepreneurial practices could lead to decline in unemployment growth. Agwu (2018) contended that introducing entrepreneurship to youth can serve as an alternative means of income generation and ultimately stem the tidal waves of unemployment. This advocacy by experts made youth engaged in entrepreneurship, then comes COVID-19, when COVID-19 hits Nigeria, government declares STAY AT HOME for almost a year. This has crippled almost all entrepreneurship activities, which rendered entrepreneurs into a terrible situation. This therefore prompted the research to find out the impact of COVID-19 on the building technology entrepreneurs and to device ways out for them.

Purpose of the study

1. To find out the impacts of COVID-19 on Block/Brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis.
2. To find out the remedies to the impact of COVID-19 on Block/Brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis.

Research questions

1. What are the impacts of COVID-19 on Block/Brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis?
2. What are remedies to the impact of COVID-19 on Block/Brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis?

Methodology

The research design was mixed-method, that is; combination of qualitative and quantitative methods, the area of the study was Shamaki/Bajoga ward of Gombe metropolis, the population of the study was all block/brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis, and they are 14 in number, sample of the study was 7 block/brick manufacturers which were randomly selected from the total population of 14. The methods of data collection were interview and a direct responses was presented in tabular form. The second method of data collection was structured questionnaire was used to collect data for research questions one and two respectively. The questionnaire has 5-points and was based on class limit and class interval scale, and the options were; Strongly Agreed (SA) which has range of 4.50-5.00, Agreed (A) which has range of 3.50-4.49, Undecided (UD) which has range of 2.50-3.49, Disagreed (DA) which has range of 1.50-2.49, and Strongly Disagreed (SD) which has range of 0.50-1.49. for research question one the direct responses of the respondents were presented as the findings, while for research question two the data were analyzed using mean.

Results

Table 1: Respondents' Responses on the Impact of COVID-19 on their Entrepreneurship

Respondents	Responses
Respondent 1	● We lost our laborers because of inability to be paying them. ● The prices of materials we use such as cement and sand goes high because of COVID-19. For example we use to buy cement at the cost of ₦2,000.00, but with the coming of COVID-19, it shoots to around ₦4,000.00. This made us to operate at lost as we did not increase the price of our products. ● Most of the vehicles we use to covey our products have stopped moving because of the lockdown restrictions. ● Our rates of sales reduced because people have no money, and were not allowed to go out and look for money.
Respondent 2	● We have more than 50 laborers, but with the coming of COVID-19 we now have not more than 10 laborers. ● We lost our capital due to operating at lost during COVID-19. ● COVID-19 mandated us to reduce the wages we use to pay our laborers.
Respondent 3	● Our rate of production reduces due to lock-down, this resulted to unavailability of our products. ● Rate of sales also reduces because people were locked in their homes, hence nobody comes out to buy our products.

Respondents	Responses
	● Prices of the materials we use shoots up because some of the materials we use were imported from outside, and movement was restricted and this made the materials to be scarce and eventually made their prices high.
Respondent 4	● Lock-down made us lost our workers. ● No circulation of money in our industry due COVID-19. ● No sales of products due to COVID-19. ● No importation of materials for production due to COVID-19. ● Price of materials for the production increases due to COVID-19. ● We lost our capital due to COVID-19.
Respondent 5	● We stop selling our products due to COVID-19. ● COVID-19 caused high price of the materials we use in our production. ● We also lost our laborers due to COVID-19. ● We are incapable to pay the little laborers that left because there is no market. ● Low production, before COVID-19 we produce 1,100 blocks per day, but now the highest we produce per day is 530.
Respondent 6	● Our production rate is now very low due to COVID-19. ● Our rate of sales also becomes very low due to COVID-19. ● We lost our laborers. ● Obtaining materials we use for our production gives us difficulties because of high price and unavailability.
Respondent 7	● Very low rate of sales, before COVID- 19 we sale 2,000 to 3,000 blocks in a week, but now we hardly sale 500 in a week. ● High price of materials like; cement and sand. ● Our production rate becomes very low due to COVID-19.

Table 2: Mean Responses of the Respondents on the Remedies to the Impact of COVID-19 on their Entrepreneurship

S/N	Items	Mean	Remarks
1.	Government should include the block/brick manufacturers in funding support scheme to help them regain their capital.	4.00	Agreed
2.	Non-governmental agencies should render support of funds to block/brick manufacturers to help them regain their capital.	4.29	Agreed
3.	Banks should give loans to block/brick manufacturers to help them regain their capital.	3.57	Agreed
4.	Block/brick manufacturers should diversify their businesses by introducing other products like interlocking tiles, carves, precast slabs etc, this will boost their income.	4.29	Agreed
5.	Block/brick manufacturers should use online system of buying and selling to abide by COVID-19 rules.	3.57	Agreed
6	Block/brick manufacturers should register with insurance companies in case of any eventuality like COVID-19 and it's like, their lost will refunded back to them.	4.00	Agreed

Findings of the study

1. As part of the impact made by COVID-19 ON Block/Brick manufacturers, it made them lost their laborers because of inability to be paying them, it made the prices of materials they use such as cement and sand goes high, it made them to operate at lost, their vehicles which they use to covey products to buyers have stop moving because of lock-down which resulted to petrol and diesel scarcity. Rates of sales reduced because people have no money, and were not allowed to go out and look for money, lost of capital also constituted part of the impact of COVID-19, and very low rate of sales.
2. The study also revealed that the block/brick manufacturers agreed part of the remedies to impact of COVID-19 on their entrepreneurship are that government should include the block/brick manufacturers in funding support scheme to help them regain their capital. Non-governmental agencies should render support of funds to help them regain their capital. Banks should give them loans to help them regain their capital, and that they should diversify their businesses by introducing other products like interlocking tiles, carves, precast slabs etc, this will boost their income. Block/brick manufacturers should also use online system of buying and selling to abide by COVID-19 rules, and that they should register with insurance companies in case of any eventuality like COVID-19 and it's like, their lost will refunded back to them.

Discussion on the findings

For research question one, the findings of the study revealed that COVID-19 made a great impact on Block/Brick manufacturers in different aspects such as; lost of capital, lost of workers, high cast of materials, low production, low sales, operating at lost among others. These findings agreed with Esha (2021) who affirmed that the pandemic has disrupted many businesses around the world due to complete or partial lockdown and social distancing measures, and that the lockdown that followed the outbreak of COVID-19 brought the manufacturing units to a standstill. It also agreed with the contention of Albaz, Mansour, Rida, & Schubert (2020), who contended that Small and Medium Enterprises (SMEs) have been hardest hit by the COVID-19, as sectors like construction activities among others are overrepresented by SMEs. Also in a study by Asian Development Bank (2021), they explained that other priority industries such as building and construction were also negatively affected in 2019 due to shocks of COVID-19, and that COVID-19 seems to have spurred entrepreneurship. The findings also agreed with the findings of International Labor Organization (2021) who found that the COVID-19 pandemic has affected economies and societies around the world and caused an unprecedented fall in economic activities.

For research question two, the findings revealed that as remedies to impact of COVID-19 on their entrepreneurship are that government should include the block/brick manufacturers in funding support scheme to help them regain their capital. This agreed with the opinion of Ngozi & Jummai (2016) who said government should make loans accessible to entrepreneurs. The findings also agreed with Saidu, Dahiru & Sulaiman (2017) who expressed that in order to support entrepreneurship, government and other NGOs should assist in funding entrepreneurship businesses. The findings also revealed that Block/Brick manufacturers should diversify their businesses by introducing other products like interlocking tiles, carves, precast slabs etc, this will boost their income. Block/brick manufacturers should also use online system of buying and selling to abide by COVID-19 rules. This agreed with Ratten, (2020) who explained that entrepreneurship involves assessing opportunities and coming up with innovative ideas. A certain level of creativity is required to facilitate different ways of thinking, which allow new ideas to emerge. It also agreed with explanations made by Fillis & Rentschler (2010) who explained that creativity is seen as a crucial element in problem-solving. It was revealed also in the findings of the second research question that Block/Brick manufacturers should register with insurance companies in case of any eventuality like COVID-19 and its like, their lost will refunded back to them. This agreed with Gunn (2019) who asserted that insurance is always essential, but it takes on new significance when you are an entrepreneur, because it will protect your business, save you money on your tax bill and increase your legitimacy in the eyes of customers.

Conclusion

This study was conducted to find out the impact made by COVID-19 on Block/Brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis, the study adopted mixed-method, where qualitative and quantitative methods of designs were used. The study revealed and concluded that COVID-19 has seriously affected Block/Brick manufacturers in Shamaki/Bajoga ward of Gombe metropolis, just as it did to other entrepreneurial businesses. These impacts are more on the areas like; lost of capital, lost of laborers, low production, low sales among others. Therefore the study also provided some remedies to that impact made by COVID-19 which include; need for assistance by government, banks and NGOs among others to the Block/Brick manufacturers.

Recommendations

1. Governments, Banks and NGOs should come to the aid of Block/Brick manufacturers in order to regain their lost capitals and forge ahead with their businesses.
2. Block/Brick manufacturers should register their businesses with insurance companies so that whenever such unfortunate event like COVID-19 occurs to them their capitals will be saved.
3. Block/Brick manufacturers should diversify their businesses to include the production of other related to them like; interlocking tiles, ring slabs pre-cast slabs among others.

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IMPACT OF COVID-19 PANDEMIC ON THE MANUFACTURING SECTOR PERFORMANCE IN NIGERIA

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Abstract: *The COVID-19 pandemic ravaging the world has taken a hard toll on many sectors of the economy such as the health sector, tourism sector, educational sector, and has caused a disruption in revenue generating economic activities in Nigeria. The aim of this study was to analyses the impact of Covid-19 pandemic on the performance of the manufacturing sector in Nigeria. The study used a qualitative technique of analyses where tables and figures were used. The study discovered that prior to the pandemic, the sector has continuously faced several structural challenges which have caused many manufacturing firms to shut down, limiting growth and investment inflows into the sector. This has led to the continuous decline in the major variables determining the manufacturing sector performance in the country (such as capacity utilization, manufacturing exports etc). The study also discovered that the pandemic further add to the already deteriorated performance of the sector through its measures of locked down and border closures. It further discovered that the COVID-19 pandemic which led to suppressed consumer demand and supply-chain disruption resulted in a decline in real manufacturing output in 2020. The study concluded that the pandemic has really add to already declining performance of the Nigeria manufacturing sector. For the sector to perform well, the study proffer some way forward for the government which include among others; developing an industrial policy and sectoral plans for identified priority areas, ensuring commitment to implementation of existing plans, addressing the challenge of insecurity, and providing targeted infrastructure.*

Keywords*: Manufacturing Sector, COVID-19, Performance Index, Pandemic*

Introduction

The manufacturing sector of any economy is regarded as the pivot upon which other sectors of the economy revolve. According to Ududechinyere, Michael and Mbam (2018), the manufacturing industry has overtime been one of the key drivers of economic development in most national economies. In agreeing with this, Bhorat (2017) asserted that very few if any cases, anywhere in economic history, where a country has achieved sustained and sustainable economic development, which has not been led by manufacturing. For example, since the industrial revolution, manufacturing has acted as the primary engine of economic growth and development.

Great Britain was the first industrialized country and became the technological leader in the world economy. From Great Britain manufacturing diffused to other European countries such as Belgium, Switzerland, and France and later to the United States. Which followed a radically different path towards industrialization based on primary exports, abundance of land and natural resources, and scarcity of labour (Crafts, 1977; Bergier, 1983). In Africa, the few economies that have showed some level of economic growth and development are the ones in which considerable attention have been given to the development of the manufacturing sector. Some of these countries include South Africa, Mauritius, Botswana, Egypt, Namibia and Senegal. Mauritius is in fact a suitable example. From a poor sugar-dependent nation, this country has been able to diversify its economy to the point that manufacturing has become its primary source of revenue, with the result that its increased per capita income of about $10, 000, is many times higher than sub-Saharan Africa's average of $300. However, the key government strategies in Mauritius lie in the establishment of Export Processing Zones, duty free areas and the provision of tax incentives to businesses. Similarly, government increased spending on manpower and infrastructure development all of which aided the growth of industry in this country. In Nigeria however, the manufacturing sector is still under-developed, with average capacity utilization of 54.9% compared to 81.69% average for South Africa and 74.99% average for China (CEIC, 2020). This is despite the efforts of government, and all the economic policies introduced and the importance of the sector in the Nigerian economy, given its capacity to foster wide and efficient linkages among different sectors of the economy.

Performance indices of manufacturing sector in Nigeria

Manufacturing sector refers to the numerous industries which are involved in the production/ manufacturing and processing of items and indulge in either creation of new commodities or in value addition (Adebayo, 2010). To Dickson (2010), manufacturing sector accounts for a significant share of the industrial sector in developed countries. The final products can either serve as finished goods for sale to customers or as intermediate goods used in the production process. According to Loto (2012), manufacturing sector refers to an avenue for increasing productivity in relation to import replacement and export expansion, creating foreign exchange earning capacity, raising employment and per capita income which causes unrepeatable consumption pattern. Mbelede (2012) opined that manufacturing sector is involved in the process of adding value to raw materials by turning them into products. Therefore, manufacturing is the key sector in an economy and it involves the conversion of raw material into finished goods. In the opinion of Charles (2012), manufacturing industries creates employment and also boost agriculture, thus diversifying the economy by making the nation to increase its foreign exchange earnings. Manufacturing industries came into being with the occurrence of technological and socio-economic transformations in the Western countries in the 18th-19th centuries. This period was widely known as industrial revolution. It all began in Britain and replaced the labour intensive textile production with mechanization and use of fuels.

Performance is regarded as achievement of the organization/unit in relation with its set goals. It includes outcomes achieved, or accomplished through contribution of individuals or teams to the organization's strategic goals. The term performance encompasses economic as well as behavioural outcomes. Manufacturing or industrial sector refers to the productions of goods and services through combined utilization of raw materials and other production factors such as labour force, land and capital (Ebele & Iorember 2016). Its performance reflects how the sector has fared over time in response to factors such as the behaviour of exchange rate. This takes into accounts the individual and aggregate changes (positive or negative) in the outcomes of the composites units of the sector. It could be measured in monetary terms or other suitable units of measurement. It is a very relevant economic measure that assesses the health of the productive sector of the economy and makes comparison possible. The performance of the manufacturing sector of an economy is often measured as the share of manufacturing sector output in total gross domestic product of that economy, and as the manufacturing capacity utilization of the economy.

COVID-19 and its advent in Nigeria

Corona viruses are a family of viruses that cause illnesses ranging from the common cold to more severe diseases such as severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS). These viruses were originally transmitted from animals to people. SARS, for instance, was transmitted from civet cats to humans while MERS moved to humans from a type of camel. Several known Corona viruses are circulating in animals that have not yet infected humans. The name Coronavirus comes from the Latin word Corona, meaning crown or halo. Under an electron microscope, the looks like it are surrounded by a solar corona. The novel Coronavirus, identified by Chinese authorities on January 7 and since named SARS-CoV-2, is a new strain that had not been previously identified in humans (Wikipedia, 2020). Chinese health authorities are still trying to determine the origin of the virus, which they say likely, came from a seafood market in Wuhan, China where wildlife was also traded illegally. On February 7, Chinese researchers said the virus could have spread from an infected animal species to humans through illegally trafficked pangolins, which are prized in Asia for food and medicine. Scientists have pointed to either bats or snakes as possible sources of the virus. Signs of infection include fever, cough, shortness of breath, and breathing difficulties. In more severe cases, it can lead to pneumonia, multiple organ failure, and even death. Current estimates of the incubation period - the time between infection and the onset of symptoms - ranging from one to 14 days. Most infected people show symptoms within five to six days. However, infected patients can also be asymptomatic, meaning they do not display any symptoms despite having the virus in their systems (Wikipedia, 2020).

In Nigeria, the news about COVID-19 outbreak in China was initially mooted a joke not until the nation recorded its first case on the 27th February, 2020. It was confirmed in Lagos State, an Italian citizen who works in Nigeria had returned on 25 February from Milan, Italy through the Murtala Muhammed International Airport, fell ill on 26 February, and was transferred to Lagos State Biosecurity Facilities for isolation and testing. Presently, Nigeria is having 199 covid-19 cases, two dead and twenty recovered. It was also not yet dawn on greater percentage of Nigerians until cases began to rise astronomically in the weeks afterwards, forcing the Nigerian government at the state and national levels to impose lockdowns in March, 2020. The impact of the measures to contain the pandemic in Nigeria was more pernicious than anticipated. Productive activities of many manufacturing firms were brought to a halt following the month-long lockdown, with inevitable courses of action such as cutting down their workforces, work hours, budgets and salaries. Firms and businesses that pose a high risk of COVID-19 infections remain grounded as their owners strategize new business models and modes of engagement. The role of manufacturing sector in an economy is indispensable as it accounts for nearly 16% of the global GDP in 2019(Central Bank of Nigeria, 2020a). As a result, the government across nations primarily focuses on encouraging the manufacturing sector, no nation has escaped widespread disruption from the COVID-19 pandemic, but some have fared better than others. Even, China (the fastest growing economy in the world), where the crisis began has equally suffered disproportionate effects. As reported by the United Nations conference on trade and development (UNCTAD, June, 2020), the COVID-19 outbreak has resulted in fall in global foreign direct investment (FDI) to by 5% to 15% (depending on the severity of the pandemic in individual economies). This fall is due to the distorted productive activities in the manufacturing sector necessitated by factory shutdown. It is against this background that the study intent to analyses the impact of the pandemic on the performance of the manufacturing sector in Nigeria.

Nigeria manufacturing sector and COVID-19 pandemic

COVID-19 had a major impact on different sectors of the Nigerian economy. Specifically for the manufacturing sector, the impact of the pandemic was huge. Many manufacturing companies engaged in the production of non-essential items were forced to shut down operations in different parts of the country in the second quarter of 2020. This, and several factors such as weakened consumer demand, supply chain disruption and higher inflation resulted in a contraction of the sector's output by 2.75% in 2020. Manufacturing Purchasing Manager's Index (PMI) was in the contraction region (below 50 index point) for the most part of the year 2020. This was reflected in the higher prices of input, low levels of employment in the sector and weak manufactured goods exports. The pandemic also led to a larger trade deficit in the manufacturing sector, which stood at ₦11.76 trillion in 2020, according to data from the National Bureau Statistics (NBS). Nigeria's manufacturing sector faced several challenges even before the outbreak of COVID-19. Prior to the pandemic, the sector had suffered mainly from the closure of land borders in September 2019, which reduced informal exports and resulted in direct negative effects on several manufacturing outfits in Aba, Kano and Lagos. Perennial problems of power supply, logistics bottlenecks, infrastructure deficits, limited access to credit, foreign exchange scarcity have continuously affected the performance of the sector overtime. Growth of the manufacturing sector has been stagnant (average growth of -0.60% from 2015 to 2019) while capacity utilisation has remained below par as depicted in Table 1.

Table 1: Average Capacity Utilization of the Manufacturing Sector in Nigeria

Year	2015	2016	2017	2018	2019	2020
Capacity Utilisation	59.90	49.00	52.00	55.00	56.00	45.20
Growth (%)	0.20%	-18.20%	6.10%	5.80%	3.30%	-20.40

(Source: Central Bank of Nigeria, 2020a)

Based on nominal GDP figures released by the National Bureau of Statistics (NBS), Nigeria's manufacturing sector was valued at ₦19.54 trillion in 2020 (2019: ₦16.78 trillion). Between 2015 and 2018, manufacturing share of nominal GDP was below 10% despite improving economic growth figures. Its share in GDP increased to 11.6% in 2019 and 12.8% in 2020. The increase in 2020 was mainly owing to higher inflation and a larger decline in the output of critical sectors compared to that of the manufacturing sector. The manufacturing sector is made up of 13 subsectors. They include Oil Refining; Cement; Food, Beverage and Tobacco; Textile, Apparel and Footwear; Wood and Wood Products; Pulp, Paper and Paper Products; Chemical and Pharmaceutical Products; Non-Metallic Products; Plastic and Rubber products; Electrical and Electronics; Basic metal, Iron and Steel; Motor vehicles & assembly and Other Manufacturing. The sector is dominated by informal players that are mostly micro, small, and medium enterprises. According to data from the NBS, the sector employed at least 5.4 million individuals in 2017. This represents 7% of Nigeria's labour force population that are working. Manufacturing is Nigeria's third largest sector in terms of employment, after Agriculture and Trade. The Figure 1 shows the performance of the Nigeria's manufacturing sector.

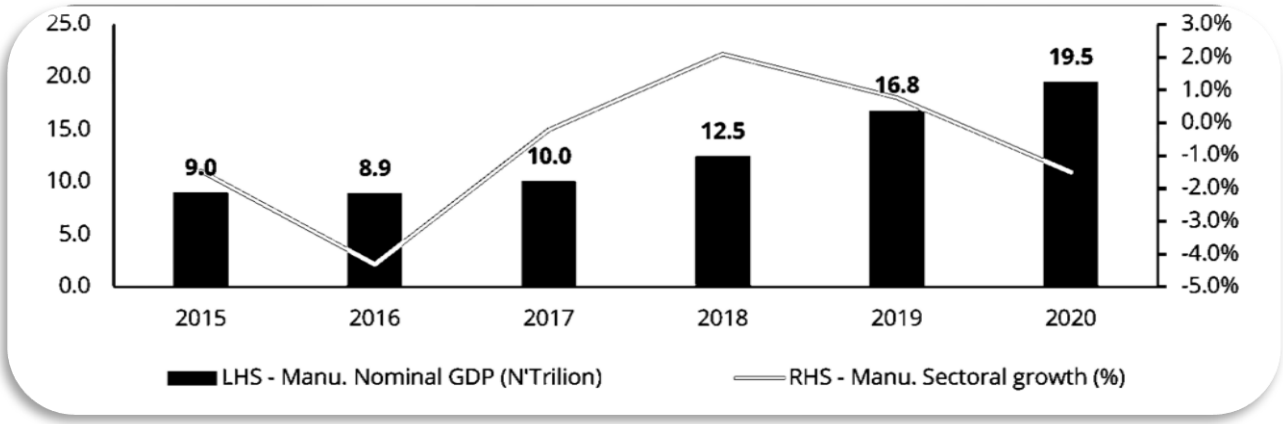


Figure 1: Performance of Nigerian Manufacturing Sector (Source: Central Bank of Nigeria, 2020b)

The Nigerian manufacturing sector is dominated by informal players that are mostly micro, small, and medium enterprises. According to data from the NBS, the sector employed at least 5.4 million individuals in 2017. This represents 7% of Nigeria's labour force population that are working. Manufacturing is Nigeria's third largest sector in terms of employment, after Agriculture and Trade. Just like major sectors of the economy (Agriculture, Finance, Information and Communication, etc), output of the manufacturing sector is skewed in favour of a few sub-sectors. As at 2020, three of the thirteen sub-sectors accounted for 77% of total manufacturing output. These three sectors are Cement (17.6%), Food, Beverage and Tobacco (37.1%) and Textile, Apparel and Footwear (22.0%) (Nigerian Submit Group, 2020). This means that the remaining ten sub-sectors contributed a combined share of 13% to manufacturing output in the year.

Among the thirteen sub-sectors, Food, Beverage & Tobacco; Chemical & Pharmaceutical Products and Cement have been the best performing in the last four years in terms of output expansion. Average output growth in these industries was 2.2%, 1.1% and 2.3% respectively, from 2017 to 2020. Growth of these sectors has been driven mainly by two factors- available demand/market opportunity and government policy. For Chemical & Pharmaceutical Products, higher demand for pharmaceutical products occasioned by the COVID-19 pandemic played a great part in improving the sector's output. At present, Nigeria is unable to satisfy the local demand for most manufactured goods due to the low productivity level of the sector. As a result, manufactured goods have accounted for over 55% of total imports since 2018 (NBS, 2021). With Nigeria having a sizeable consumer market, some countries in the Economic Community of West African States (ECOWAS) are importing manufactured goods for re-export to Nigeria. For instance, prior to the closure of Nigeria's land borders in 2019, Benin Republic was the largest importer of rice from Thailand, despite having a small market.

On exports, manufactured goods accounted for 7.7% of Nigeria's total export earnings in 2020. As a share of manufacturing sector GDP, manufactured goods export averaged 6.2% in the last four years (2017 – 2020), according to data from the NBS. Oil exports earnings in 2020 was 11.5 times larger than export earnings from the manufacturing sector. These statistics suggest that Nigeria is not producing enough manufactured goods for exports. Table 3 presents Nigeria's export earnings from oil and manufacturing in billions of naira.

Table 3: Nigeria's Export Earnings from Oil and Manufacturing (₦ Billion)

Source	2018	2019	2020
Oil Earnings	17,340.10	16,673.70	11,089.30
Manufactured Goods Earnings	645.70	2,074.40	960.80

(Source: Central Bank of Nigeria, 2020b)

The structure of Nigeria's manufacturing sector reflects weak diversification and the existence of untapped areas in manufacturing, thus, signifying numerous investment opportunities. In terms of investment, the intersection of market opportunities and government support policies such as the Free trade zone incentives and pioneer status incentives among others have resulted in the inflow of investments into the manufacturing sector. For instance, over the years, companies such as Nestle, Dangote, BUA Group, PZ, Beloxxi Industries, to mention a few have invested in key areas of the sector - food processing, motor vehicle production, oil refinery, oil palm and cement (Nigerian Submit Group, 2020). However, despite the numerous opportunities in the sector, the quantum of investment in the manufacturing sector has been sub-optimal. In the last 8 years, only ₦5.73 trillion ($15.87 billion) has been invested in the sector. Specifically for FDI, the gap between announced investment and actual investment points to the low confidence level of investors in the real sector. Between 2019 and 2020, investment announced stood at $46.4 billion, with the manufacturing sector accounting for 25% (US$11.56 billion) of these announced investments. Actual FDI inflows into the economy in both years was US$1.96 billion (just 4% of announced investment) with sectors such as Telecoms, Trade, Agriculture and Manufacturing accounting for the larger inflows (NIPC, 2021). One major reason why the manufacturing sector has not attracted significant investments when compared with those of other countries is policy and regulatory inconsistency. Frequent reversals of government policies on importation, lack of implementation of the provisions in national policy documents and regulatory lapses are key factors that have affected the manufacturing sector in Nigeria.

Challenges facing manufacturing sector in Nigeria

Manufacturing sector is categorized into engineering sector, construction sector, electronics sector, chemical sector, energy sector, textile sector, food and beverage sector, metalworking sector, plastic sector, transport and telecommunication sector. The manufacturing sector of the Nigerian economy has been performing sub-optimally for a long time before the emerge of COVID-19 pandemic despite the diverse incentive packages made available by the government due to myriads of challenges which bedeviled the sub-sector. Among the constraints which impede its optimal performance include the following:

1. ***Critical Infrastructure Deficit*:** Poor quality of infrastructure is the longest-standing problem of the manufacturing sector in Nigeria and has contributed to the high cost of production. It is a disincentive for investment despite huge potentials and a large consumer market in Nigeria. Bad road networks and inadequate electricity supply make it difficult for businesses to maximize returns and limit cost of operations. According to the World Bank (2021), businesses in Nigeria lose about $29 billion annually due to the country's unreliable electricity. The Manufacturers Association of Nigeria (MAN) also confirmed that inadequate electricity supply & the high cost of alternative energy sources are the topmost challenges hampering the

performance and growth of the sector. Available data show that Nigeria lags behind the average on almost all basic infrastructural facilities. Social infrastructure also is lacking in the health and education sectors. In addition, the quality of the service is poor, supplies are unreliable, and disruptions are frequent and unpredictable. Most Nigerian roads are in different stages of disrepair. Available data shows that paved road in Nigeria was 17% in 1970. It increased to 30.0% in 1990. Despite the huge foreign exchange earnings from crude oil, it was allowed to deteriorate to 24.0% and 18.1% in the year 2000 and 2013 respectively (World Bank, 2013). Electricity supply is in a precarious state; always unstable, unreliable and inadequate to meet minimum requirement in the country. Ekpo and Adaowo (2012) observed that for over three decades now, Nigeria's power sector has been ineffective and inefficient in the generation, transmission and distribution of adequate electricity to meet minimum country's requirement; leading to a wide gap between the demand for and the supply of electricity. Infrastructure deficit (availability, cost and efficiency) in Nigeria has posed serious challenges to manufacturing sector performance because of many economic costs like direct cost of production and production delay associated with it. Inadequate and inefficient infrastructure services had also raised costs of production of manufacturing firms substantially since in most cases, manufacturing firms are compelled to invest in alternative sources. Almost all manufacturing firms in Nigeria are forced to have alternative self-supply electricity through private generators, dig boreholes for water supply, and construct access roads to their sites, whose costs are about three times more expensive compare to public provision. These extra costs incurred by firm had been estimated to be from 10% to 25% of the total machinery and equipment budget of firms (The World Bank, 1998). Enebeli-Uzor (2012) maintained that private power generation by manufacturers account for about 30% of manufacturer's cost of production and this has severe negative impact on the competitiveness of Nigerian products and the profitability of manufacturing firms. The poor state of roads in the country has also created a constraint in moving raw materials and finished goods across the country, thus making Nigerian made goods non-competitive due to additional costs. In addition to discouraging investment in manufacturing sector of the Nigerian economy, infrastructure deficit also makes the full potential of the sector harmstrung which account for its historical low performance in terms of low capacity utilization, low contribution to the GDP, foreign exchange earnings, exports, employment generation and wealth creation for some years now.

2. ***Inadequate Access to Credit*:** In addition to the fact that Nigerian banks are mostly interested in advancing overdrafts and not long - terms loans needed by manufacturing firms, majority of manufacturing firms in Nigeria cannot access banks loan due to high interest rates and inability to provide collateral securities. Consequently, many manufacturing firms in Nigeria, especially medium and small firms, are forced to depend on internally generated funds, funds from family members, friends and informal sector. Finances from these sources, most often, are extremely inadequate for firms to exploit profitable investment opportunities.

3. ***Foreign Exchange Availability and Rate*:** The manufacturing sector of Nigeria is highly import-dependent. The capital goods such as plants, machinery and equipment, spare parts and greater percentage of raw materials used by manufacturing industries are imported and foreign exchange is needed to acquire them. Hence, there is a strong relationship between foreign exchange availability and foreign exchange rate and manufacturing sector performance in the country. Inadequate foreign exchange and high foreign exchange rate increases the cost of the imported inputs of production. This in turn increases the cost of production, reduces the size of output and the returns to the investors as well as the competitiveness of the product in both domestic and foreign markets through high prices. In Nigeria, from 1970 to 1985, non-market regime monetary policy was in operation and foreign exchange rates were fixed by the government. The exchange rate, which prevailed in Nigeria then, was relatively low. As shown in Figure 3, up to 1985 less than ₦1.00 was exchanged for $1.00. Foreign exchange rate did not pose a problem to manufacturing sector rather the challenge was mostly that of obtaining import license. Following the introduction of structural adjustment programme (SAP) and

subsequently the deregulation of the Nigerian economy from 1986, the forces of demand and supply became the determinants of foreign exchange rate. Because domestic consumption, production and investment are highly import-dependent, there had been pressure on foreign exchange demand which had continued to lead to depreciation of the naira. As shown in Figure 3, there had been a dramatic increase in exchange rate over the years. The exchange rate which stood at ₦2.02 to $1.00 in 1986 maintained a downward trend to ₦84.00 and ₦136.80 to $1.00 in 1997 and 2004 respectively. In 2014, the exchange rate was ₦158.55. The effect had been persistence high prices of imported inputs in terms of naira and high cost of domestic production. Consequently, this has been transmitted to the whole economy in the form of low manufacturing capacity, low manufacturing output, high prices of manufactured goods and non-competitiveness of Nigeria's goods in both domestic and international markets.

4. ***High Interest Rate*:** High interest rate has a wide range of effects on the economy in general and manufacturing sector performance in particular. It strongly affects the size of investible fund and the ability of manufacturing firms to borrow from banks. The interest rate of concern here is the lending rate. Lending rates are of two types – the minimum (prime) and the maximum lending rates. The prime lending rate is the cost of funds to borrowers of money. It is interest rate on loans. Figure 3 shows prime lending rates on loans in Nigeria between 1970 and 2014. As observed from the figure, the rate of interest on loans that prevail in Nigeria during period under preview were very high and tended to discourage borrowing for investment purposes by operators of manufacturing sector. It rose from 8.0% in 1970 to 29.80% in 1992 before declining sluggishly to 24.82% and 17.09% in 2002 and 2013 respectively. As could be seen, a remarkable feature of the lending rate is that except for 1985, from 1982 to 2013 it has remained double digits persistently.

5. ***High Inflation Rate*:** Inflation rate is an important determinant of manufacturing sector performance. It is indisputable that moderate inflation is needed for business to strive profitably in a country but high and rising inflation rates, being an indicator of macroeconomic instability, is inimical to manufacturing sector performance. By reducing the value of money, it discourages saving and lowers the economy's saving rate which culminates to low investible funds for investment in the economy. The inflation rate which reduced to 5.4% in 1986 rose to as high as 57.2% and 72.8% in 1993 and 1995 respectively before moderating at 29.4%, 20.2%, 17.9% and 10.12% in 1996, 2002, 2005 and 2012 respectively. From 1970 to 2014, except for a few years (1982, 1985, 1986, 1990, 1997, 1999, 2000, 2006, 2007, 2013 and 2014) there was double digit inflation in Nigeria. High inflation rates, especially double digit inflation rate, which held sway in the Nigerian economy for many years, seriously disrupted economic and business relations in the country. It raises expectation of currency devaluation which heightens fears of rising costs of imported capital goods and raw materials. High inflation rate has been a serious disincentive to manufacturing business in Nigeria as it exerts strong negative influence on real interest rate, cost of production, competitiveness of the Nigerian products as well as the profitability of manufacturing firms.

6. ***Multiple Taxes and Levies*:** The operators of manufacturing sector in Nigeria are made to pay multiple taxes, levies and other spurious charges. Among the taxes, levies and charges imposed on them include Education Tax, National Science and Engineering Infrastructure (NASENI) tax, Value Added tax, Environmental Sanitation Tax, Advert on Vehicle, Kiosk, Shop and Business premises Tax, National Science and Technology Fund (NSTF), Development Levy, national advertisement fee, haulage and permit fee, tenement rate charge, neighbourhood improvement charges, generating plant charge, commercial premises charges, big vehicle emblem fee, fire service charge, pollution charge, commercial premises charges (Banjoko, Iwuji and Bagshaw, 2012). Multiple taxes, levies and charges are serious disincentives to manufacturing sector performance as they constitute heavy cost burden on the manufacturing firms. It hikes the cost of production and the unit cost of domestic manufactured products, impede on the competitiveness domestic manufactured goods in both domestic and international markets and consequently reduce the profit margin of manufacturing firms.

7. ***Insufficient Demand*:** There had been insufficient demand for manufactured goods produced in Nigeria. First, not many Nigerian manufacturing firms export their products which would have expanded their market size and frontier rather they rely mostly on domestic market. In the domestic market, the large population size and growth rate which ought to have been an advantage have been short-changed by low income of the citizens, high unemployment rate and poverty prevalence in the country. Secondly, domestic market is flooded with foreign manufactured goods following massive importation, dumping and smuggling of those goods into Nigeria. This in effect has subjected locally manufactured goods to stiff competition with foreign manufactured goods produced through the use of cutting- edged technology and at low unit cost. The unit cost of manufactured goods in Nigeria is high due to high exchange rate and interest rates together with the costs of private provision of critical infrastructure, especially electricity, which translate into high cost of production in the country. In addition, some domestic manufactured products are of poor quality. The consumer behaviour of average Nigerian is characterised with penchant for foreign goods. This accounts for importation of even substandard foreign goods in the midst of better home-made ones. Consequently, there had been low demand for home-made manufactured goods, reduction in capacity utilization of many manufacturing firms as well as drastic reduction in profitability manufacturing activities.
8. ***Imported Inputs of Production*:** The local content of Nigeria's manufacturing sector is very low. Inputs of production (raw materials, machinery, spare parts and even skilled workers) are mostly imported. For this reason, manufacturing sub-sector's performance will continue to have problem because manufacturer's inability to access raw materials due to stiff competition from foreign firms. There will be difficulty in acquiring machinery, spare parts and even skilled workers due to inadequate foreign exchange and high foreign exchange rate.
9. ***Low Level of Technology and Innovation*:** It has been argued that the faster mean which a nation can achieve sustainable economic growth and development is neither by the level of its endowed natural resources, nor that of its vast human resources, but through technological innovation, enterprise development and industrial capacity (Ademola, 2012). Improvement in technology and innovation lead to more efficient method of production which reduces costs, and raise output and the rate of return on investment. Innovations and technology are the primary forces propelling modern days manufacturing. Nigeria's manufacturing firms are seriously lagging behind in innovations and cutting – edge technology employed in modern days manufacturing. They are still relying on the old technology and obsolete machines which industrialised and emerging economies had discarded. This accounts for overdependence of the Nigerian manufacturing firms on foreign inputs of production (like machinery, spare part, tool and raw material), inability to produce quality finished products, frequent breakdown of the manufacturing systems, low capacity utilization and none competitive unit cost of production.
10. ***Institutional Inefficiency*:** Institutions encompass the public bodies through which the state discharges its most fundamental responsibilities such as maintaining law and order, investing in essential infrastructure, and raising taxes to finance its activities (World Bank, 1991). These public bodies in Nigeria had been plagued by various vices like corruption, bureaucratic red tapes and unnecessary government interference which had weakened and incapacitated their performance thereby rendering them inefficient in enhancing manufacturing sector performance in the country. Soludo (1998) had observed that institutional factors such as corruption, bureaucratic red tapes, weak judicial system and unnecessary government interference in business affect private investment in Nigeria. All these factors increase the operational cost of business, engender insecurity, encourage capital flight and deter private investment especially in manufacturing. For instance, corruption is a high tax on investment. It increases transaction costs of business and engenders uncertainty thereby affecting private investment efforts. The cost of not implementing crucial reforms to reposition the sector for competitiveness are evident in the weak state of the sector and in Nigeria's high unemployment and poverty rates. Good sectoral planning, therefore, must be accompanied by effective implementation to ensure that Nigeria becomes a prosperous nation in the near future.

Conclusion

The current situation of the country requires urgent intervention by the government to develop the industrial sector in Nigeria. Developing Nigeria's manufacturing sector is the solution to Nigeria's foreign exchange problems. The sector has the potential to create jobs and lift millions of Nigerians out of poverty, if the current challenges are addressed by the government. Already, there are several initiatives and interventions in the manufacturing sector, ranging from import restrictions to the establishment of 43 export processing zones which are currently at different stages of development, according to the Nigerian Export Processing Zones Authority. In addition, the National Action Committee of the AfCFTA is working to develop Nigeria's strategy for the AfCFTA, which commenced in January 2021. These initiatives, and many more, will influence the performance of the manufacturing sector. It becomes imperative that there is synergy and consolidation of efforts from all government ministries, departments and agencies involved in the development of the sector.

The way forward

Some crucial actions are required from the Nigerian government to attract significant investment into the manufacturing sector. They include:

1. ***Develop an Industrial Policy and Sectoral Plans for Identified Priority Areas*:** As revealed earlier, the few sub-sectors in manufacturing that have attracted private investment are those that enjoyed significant government support. As a way forward, the federal and state governments need to identify priority areas in the manufacturing sector and communicate this to investors. This must be followed by the development of an industrial policy and sectoral master plans that set clear goals, identify linkages, and devise strategies of attracting and maintaining investments in the sector. Not only will this create some level of certainty for potential investors, it will also highlight clear roles of stakeholders in achieving set goals. Cassava, rice, maize, wheat processing, pharmaceuticals, oil refining are areas that should be prioritized. It is important that the government moves beyond providing general incentives of pioneer status, tax holidays, etc. to delivering specific sectoral support – planning and coordination – for key areas in manufacturing. This is important in view of the AfCFTA and Nigeria's foreign exchange problems.
2. ***Ensure Implementation*:** Sector plans must be backed by the government's commitment to ensure implementation. The Federal Ministries of Industry, Trade and Investment, Agriculture must be at the forefront of the implementation process, working with support from the Presidency. Stakeholders, including the private sector and business member organizations must constantly hold the government accountable, monitor implementation and show the implications of lack of government commitment on both economic and social goals of improving GDP and reducing unemployment and poverty.
3. ***Address Insecurity*:** The biggest threat to investment in Nigeria is insecurity. The President and National Assembly must provide security agencies with adequate resources -equipment, finance, training, etc. – to tackle the insurgency, banditry, and other forms of social vices. There must be clear key performance indicators and heads of security agencies must be sanctioned when they fail to meet relevant goals.
4. ***Provide Targeted Infrastructure*:** Inadequate infrastructure has consistently featured as a limiting factor facing businesses in Nigeria. In several instances, all that is required to attract investment into certain areas of the manufacturing sector is to build new ports, market access roads, port access roads and provide adequate electricity. This must be considered as a priority of the federal and state governments. Considering the limitations associated with government finances and Nigeria's large infrastructure deficit, the government needs to be committed to embracing public-private partnership models in developing infrastructure. Priority areas for infrastructure should include port and market access roads, rail, dry ports, seaports, and renewable energy.

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COGNITIVE COMPONENT OF PRE-SERVICE TECHNICAL TEACHERS' ATTITUDES TOWARDS ENTREPRENEURIAL EDUCATION IN NIGERIA

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Abstract: *The purpose of the study was to determine the cognitive components of pre-service technical teacher's attitudes towards entrepreneurial education in Nigeria. One Research question and a hypothesis guided the study and were tested at 0.05 level of confidence. Relevant literature related to the research question was reviewed. A structured questionnaire consisting of 6 items was developed. The questionnaire was validated by five experts in Technology Education three (3) from Abubakar Tafawa Balewa University, Bauchi and two (2) from Modibbo Adama University of Technology Yola. The reliability coefficient of the items on the questionnaire was .884 is the Crombach alpha for cognitive component and .864 as Crombach Alpha on standard number of 6 items indicating that the instrument possesses high reliability. The entire population of 444 students was used, hence there was no sampling. Statistical tools such as mean, standard deviation was used to answer the question, and ANOVA was used to test the hypothesis at 0.05 level of confidence. The finding of the study revealed that pre-service technical teachers have high disposition on the cognitive components of attitudes towards entrepreneurial education. The result further showed that there were no significant differences among the pre-service technical teachers from specialized colleges of education technical, polytechnics and conventional colleges of education on their cognitive, affective, behavioural components and overall attitudes towards entrepreneurial education. The study recommends that the entrepreneurship development center of these institutions requires equipment and miscellaneous facilities for effective business enterprise skills acquisition by the students. Well trained entrepreneurship education teachers are needed to induce student's obligation to participate fully in entrepreneurship skills acquisition activities.*

Keywords: *Pre-Service Teachers, Entrepreneurship Attitude, Cognitive Component, Technical Education*

Introduction

Technical education at the tertiary level in Nigeria has attracted special attention in recent times as the national focus is now on entrepreneurship education and basic skills acquisitions which are necessary for socio-economic development. As economic, social and technological changes gather pace, people everywhere need to develop knowledge, skills and entrepreneurship attitudes on a continuous basis so that they can live and work meaningfully in the society. Through small enterprise creation, young people can actively explore business, increases productivity and income at work and facilitate participation in economic and social life. It helps people to escape poverty by providing skills; create entrepreneurial attitude and knowledge to generate income. This calls for continues lifelong learning and entrepreneurial education to enable continuous relevance to the world of works. Entrepreneurial education knowledge helps to grow a business enterprise after graduation in the process of industrialization in general and economic development in particular.

National Commission for Colleges of Education in its Minimum Standards for Nigeria Certificate in Education (National Commission for Colleges of Education, 2012) indicated that adaptable changing situation in the present day technological development and production of technical teachers who can inculcate scientific and technological attitudes are motivated to start business enterprises combining with teaching job. The National Board for Technical Education (National Board for Technical Education, 2007) in its entrepreneurship education for polytechnics and similar institutions contain the objectives as to:

a. Understand the various life skills needed by an entrepreneur, sources of information for entrepreneurship development.
b. Appreciate the roles of commercial and development banks in small scale industrial development and functions of various support agencies in small and medium scale industrial development

Technical teachers are produced in polytechnics, specialised colleges of education technical and conventional colleges of education in Nigeria. Okorie (1979) insisted that, it is a requirement for the Nigeria Certificate of Education technical programme to possess entrepreneurship attitudes such as: observation, initiation, manipulation, and perfection. similarly National Board for Technical Education (2007), asserts that activities in schools systems today does not give students' opportunity to explore skills in their areas of specialization as entrepreneurial rather than instilling knowledge as the curriculum delivery requires. Hoewever, it is worrisome to note that after so many years of implementation of entrepreneurial education into the programmes, the attitudes of Technical teachers in making them enterprising is lacking. Aliu (2007).Therefore, the study is to determine the students' attitudes. Once attitude is connected with the identified entrepreneurship education people automatically acquire an attitude towards. The need for technical teachers who will be able to combine both teaching and business enterprise cannot be over-emphasised in today's labour market requirement. However, entrepreneurship education offered in technical teacher training programmes in Nigeria does not likely seem to prepares students' toward having entrepreneurial mindset considering the students' inability to operate business enterprise after graduation. The teaching and learning of entrepreneurship does not seem to yield productive results, consequently a graduate of such trades seems to lack the pre-requisite requirements to start and run business enterprises. The pedagogical approach of the pre-service technical teachers preparation does not seems to stimulate their attitudes, behavior, cognitive, affective or any other attributes to combining teaching and business enterprises.

Purpose of the study

The main purpose of the study was to determine the Pre-service Technical Teachers attitude towards entrepreneurial education in North –Eastern states of Nigeria. Specifically the study aimed to determine:

1. The cognitive components of pre-service technical teachers' attitudes towards Entrepreneurial Education.

Research question

1. What is the cognitive component of pre-service technical teachers' attitudes towards entrepreneurial education?

Hypothesis

A null hypothesis was formulated for the study and tested at 0.05 levels of significance;

H_{O1}:. There is no significant difference in the mean response of pre-service technical teachers from colleges of education technical, polytechnics, and conventional colleges of education on the cognitive components of entrepreneurial education.

Methodology

This study employs survey research design. Survey research designs are procedures in quantitative research in which investigators' administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, or behaviours of the population. The area of the study was the North- Eastern geopolitical zone of Nigeria which consists of Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe states. The population for the study comprises of the entire 444 pre-service NCE technical teacher from all the six (6) NCE technical teacher awarding institutions in the zone comprising of 2 Polytechnics, 2 Federal Colleges of Education (Technical) and 2 State Colleges of Education Science and Technology as presented in Table 1. These institutions were selected because they offer entrepreneurship education programme. The entire population was used hence there was no sampling. A structured questionnaire was used for data collection. The response scales for the skills needed were as follows: Very High=5, High=4, Moderate=3, Low =2, and Very Low=1.

The instrument for the study was subjected to face and content validation. The face and content validation was used to determine the instrument appropriateness to the objectives of the study and research questions. The validation of the draft instrument was submitted to the five experts in technology education, 3 from ATBU Bauchi and 2 from Modibbo Adama University, Yola to validate the instruments. All the lecturers are from the Technology Education Programme. The experts modified, restructured and reorganized the items on the instruments. Their comments include setting the items not to be ambiguous, or too easy, or too difficult, or too vague for the students to understand etc. Their observations includes; avoiding embarrassing questions, avoiding leading statements, use research variables strictly, questions must be simple and direct to point etc. The expert's judgments on the items were used fully in drafting the final copies of the instruments.

The Test-retest method was used in establishing the reliability of the instruments. The researcher with the help of three research assistants administered the instruments reliability coefficients of the instrument were 0.88 obtained. The researcher administered the instrument with the help of six (6) research assistance. The institutions where the research was conducted are; ATAP Bauchi, RAMATPOLY Maiduguri, COE Azare, COEST Bama, FCE (T) Potiskum, and FCE(T) Gombe. The instruments were distributed and retrieved after one week and return status was 88%. The research assistance helped and collected them back personally, 70% were through mail while 30% were directly given to the researcher. It was found that 444 items developed were distributed with the help of the research assistance were retrieved back from the respondents from the six institutions of the region. The research questions were answered using mean and standard deviation and the null hypotheses were tested using independent sample t-test. The data were analysed using the Statistical Package for Social Sciences (SPSS). The decision rule was based on the mean of the boundary limits of the five responses options. The real limits of number were used to ensure clarification in the respondents' responses. The mean and standard deviation was used to answer the research question where 3.00 was considered as the cut-off point.While the analysis of variance (ANOVA) was used to test the hypothesis at 0.05 level of significant.

Results

Table 1: **Mean Responses of the Respondents on Cognitive Components of Pre-Service Technical Teachers' Attitudes towards Entrepreneurial Education**

S/N	Items	N	$\bar{X}$	SD	Rmk
1.	Awareness of the importance of acquiring business enterprises skills	320	4.25	1.106	High
2.	Commitment to participate fully in business enterprises activities	320	3.75	1.065	High
3.	Dependability on complete business enterprise skills	320	3.86	1.098	High
4.	Imitativeness in complementing learning experiences	320	3.61	1.188	High
5.	Punctuality at entrepreneurial skills training sessions	320	3.49	1.315	Medium
6.	Imitativeness in complementing learning experiences	320	3.61	1.188	High

Where: SD= Standard Deviation, $\bar{X}$**=** Mean, **N=** Number of respondents, **RMKS=** Remarks

Table 1 shows the pre-service technical teachers' cognitive components towards entrepreneurial education was high with Mean and Standard deviation raging between 4.25 and 3.66 for items 1, 2, 3, 4, and 6 respectively. While, item 5 has mean of 3.49 with a standard deviation of 1.315 indicating indicates that pre-service technical teachers' has medium disposition towards the cognitive components of entrepreneurial education.

Table 2: ANOVA Summaries on Mean Responses of Respondents of the Cognitive Components towards Entrepreneurial Education

Source	SS	Df	MS	F	P	Decision
Treatment [between groups]	**0.1719**	**2**	**0.86**	**1.**	**0.758279**	**SIG**
Error	**1.1733**	**15**	**0.782**			
Ss/Bl						
Total	**0.7452**					

The ANOVA Table 2: results shows that F- value was 1.1 and p-value was .35 at 0.05 level of significant at df =2, for between groups and 15 error respectively. The calculated value (f=1.1) is greater than the table value (p value =.35), the null hypothesis was therefore accepted. Since the calculated value of P is less .05, we should reject the null hypothesis and accept the alternative hypothesis thereby concludes that the analysis of variance yields a significant F-ratio. M1=mean of Sample 1 M2=mean of Sample 2 and so forth. HSD=the absolute [unsigned] differences between any two sample means required for significance at the designated.05level.

Findings of the study

1. It was found that the disposition of the Pre-service technical teachers on the cognitive components of entrepreneurial education is high. It was found that the Pre-service technical teachers on the affective components of entrepreneurial education are high.
2. It was found that the Pre-service technical teachers on the behavioural components of entrepreneurial education are high.
3. It was found that there was no significant difference in the overall attitudes correlation of the respondents' responses. There was no significant difference in the individualised and group of the correlation coefficients of the respondents on the four entrepreneurial tasks showing that the entire institutions lack entrepreneurial training centres. Majority of the learners require entrepreneurial capacity building and skills that will make them to be self-reliant and self-employed, encouraging them, guiding them towards recognizing opportunities.

Discussions of the findings

It was found that the disposition of the Pre-service technical teachers on the cognitive components of entrepreneurial education was high with reference to the level of entrepreneurship developments. This finding is in agreement with the research of Ajayi and Lawani (2009) who stressed that cognitive domain is demonstrated by knowledge recall and the intellectual skills like comprehending information, organizing ideas, analyzing and synthesizing data, applying knowledge, choosing among alternatives in problem solving and evaluation of ideas or actions. In the same vein Jong, *et al.,* (2011) believed that sense of place can be conceived as a construct representing beliefs, emotions and behavioural commitments concerning business enterprises setting.

Attitudes toward business enterprises development may be based more on cognition. Identity-based beliefs about positive emotions associated with behavioural commitments towards business enterprises settings, were not completely interchangeable. In a related empirical study by Ajayi and Lawani (2009) believed that cognitive domain include aptitude, intelligence, memory perception and reasoning. These variables are said to constitute a great part of the predictors of academic achievement. The other area is the non-cognitive domain, which includes variables such as socio-economic status, students' attitude, personality determinants, peer group influence, self-concept, anxiety, etc

Conclusion

The aim of this research work is on conception of appropriate attitudes towards entrepreneurial education in creating entrepreneurial mindset and triggering students and graduates for self-employment as an opportunity for their future career choices after graduation. The result of this study has satisfied all the psychological attitudes requirements for changing overall attitudes of the pre-service technical teacher towards entrepreneurial education as a way of thinking for self actualization. It is clear those attitudes towards entrepreneurial education at pre-service technical teachers level in Nigeria is rather not appropriately developed to prepare students for entrepreneurship as a career option. However, from the findings of this study, it is evident that the attitudes towards entrepreneurship education opportunity for student to personally experience the search creation of market opportunities and the generation of business ideas is low. These findings call for the appropriate attitudes to be imbibed by the pre-service technical teachers' opportunities to discover business enterprises skills and attributes to roll out a new venture and to identify pre-start-up through active and practical learning.

Recommendations

In light of the discussions of research findings, the following recommendations are made:

1. Training of entrepreneurial education based on cognitive attitudes should be a priority for implementation by the Ministry of Education.
2. Entrepreneurial development based on affective attitudes should receive special consideration with regard to attitudes formation.
3. The National Commission for Colleges of Education should consider introducing behavioural changing attitudes through the use of incentives with funds and skill acquisition facilities to the graduate to developed business enterprises attitude after graduation.

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PRACTICAL SKILL RETRAINING COMPETENCIES OF TECHNICAL COLLEGE STUDENTS IN COMPUTER HARDWARE TROUBLE SHOOTING AND MAINTENANCE FOF EFFECTIVE ENTREPRENEURSHIP

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Abstract: *This study was sought to assess the practical skill retraining competency of Technical College students in computer hardware trouble shooting, and maintenance for effective entrepreneurship and self-reliance. The population of the study was made up of 161 respondents from the 3 technical colleges of Gombe state, as of no sampling was made. Two research questions guide the study, and the study employed a descriptive survey research design using a structured questionnaire. The area of the study is Gombe state. The data collected from the study were analyzed using SPSS Computer package. Mean statistic method was used to answer the research questions. The findings of the study revealed among others that, there is need to retrain technical college students some skill competencies in solving computer problems (troubleshooting) such as sound failure, no picture, etc, which are some of the skill competencies required for the students to become self entrepreneurs. While the ability to upgrade computers, defragment disc and protect virus are some of the recommended competencies skills required for the Technical College students in computer hardware maintenance to fit them into the current trends and becomes skillfully entrepreneurs.*

Keywords: *Computer Hardware Skills, Retraining, Maintenance, Entrepreneurship, Technical Education*

Introduction

The situation of unemployed in Nigeria is on the increase, where many students remained unemployed after graduation (Industrial Training Fund, 2008). in its efforts to curb such menace of unemployment, the Federal Government of Nigeria has made several attempts in order to introduce many intervention programmes, some of which include Skill for Job training under YESSO, (National Directorate of Employment, 2018) with the objectives to expose students core life skill competencies, enhance students psycho-social behaviors and norms in order to assist in their future engagement to become entrepreneurs and self reliant. Entrepreneurship is everything, it is the way forward for the 21st century, it is important for poverty reduction, raising standard of living, creation of jobs and generally increasing the socio-economic development of any nation (Beem, 2006). It is along this directions, that the National Policy on Education through the (Federal Republic of Nigeria, 2013) stated that all science and technical colleges shall establish and generates a production unit on the job training of students for commercial activities in order to become self reliant. In order to achieve such goals of the National policy on education by making the students self reliant economically, the students are required to acquire relevant practical retraining skills in computer system hardware troubleshooting and maintenance for effective entrepreneurship and self reliant.

Physical Computer Hardware Maintenance

Computer hardware are the physical components of the computer system, some of which include the central processing unit (CPU), the monitor, the mouse, the key board, bolts and nuts etc. computer hard ware requires systematic maintenance which involves taking care of the computer's physical components such as the keyboard, hard drives, internal CD, DVD, cleaning the system hardware, keeping its fans free from dust, defragmenting its hard drives regularly etc (Olaitan, 2005). According to (Gateway, 2007) keeping computer system hardware away from dust and dirt, keeping them clean and avoiding extreme temperature changes, all help to maintain hardware system, such maintenance according to (Brainbell, 2000) states that keeping liquids away from the computers and solvents should never be used to clean a computer, rather one should wipe the hardware systems such as monitors, keyboard etc regularly with a soft cloth. There are standard basic computer hardware maintenance programmes which include:

1. ***Monitor Clean Up Maintenance:*** Clean your monitor regularly and you may discover how much easier is it to read on screen texts, stay away from cleansers which contain alcohols or ammonia, instead spray a 50/50 mixture of white vinegar and diluted water on a soft cloth and wipe the monitor gently. Don't press hard on you may damage the LCD screen.
2. ***Keyboard Clean Up Maintenanc:*** Give the keyboard a good cleaning in order to keep it sanitary and professional looking, unplug the keyboard from the pc, hold it upside down and then shake it gently to dislodge large particles and debris, find a can of compressed air, hold it at 45^0 angle and aim the nozzle between the keys, spray to remove residue and grime and then give the keyboard a final shake up. To disinfect the keyboard, wipe it with a disinfectant that is barely damp, use a clean and dry microfiber cloth to dry the keyboard.
3. ***Mouse Clean Up Maintenance:*** Clean the mouse with the wipe and dry it with a microfiber cloth to remove dirt and remaining moisture.
4. ***Virus Protection and Malware:*** There is no guarantee that Antivirus software will protect the computer system from attack, this sobering assessment from United State Computer Emergency Readiness Team (USCERT) emphasizes the importance of developing safe computing habit and keeping Antivirus software running continuously. Windows 8.1 comes with windows defender, a security programme that combats malware to keep it safe. Turn on virus protection message. Click it and follow the directions to enable the virus protection. You may wish to install antivirus programmes such as AVAST or AVG.
5. ***Installing Windows:*** When windows are installed, it gives the option to enable automatic updates that keeps the computer system to be loaded with latest windows bug fixes, security patches and enchantments. if automatic updating is turned "OFF", it can be turned "ON" by clicking "SETTING" followed by "CHANGE PC SETTING" after clicking "UPDATE AND RECOVERY" then click "CHOOSE HOW UPDATE GET INSTALLED" then select the update option that work best. Example if one don't want windows to install updates automatically, one can choose to receive messages telling that new updates are available.
6. ***Updating Drivers:*** Updating drivers is one of the system maintenance and can sometimes resolve a computer problems, it also adds new functionality to the device. Drivers are vital programs that make it possible for Webcams, Monitors, Videos Cards, Printers, and other hardware to operate successfully. When manufactures releases new drivers, install them on your computer system. When the computer system automatic updates are "TURN ON" then windows installs many drivers automatically wherefrom you may choose the most recent.

Basics of computer troubleshooting

Troubleshooting involves logical and systematic identification of faults, their causes and also proposing solution to the faults (Elom, 2010). It is the process of analyzing or diagnosing a problem to the point of determining a solution. Most equipment develop fault during their normal life span which can be attributed to wear or incorrect usage and bad design. Simple steps can save a lot. There are various challenges that can be encountered by the computer user due to numerous circum stances such as:-

1. ***System Not Coming Up:*** In this situation, check if the connections are right, if cable and components fits in properly. Thereafter, you may use the reset button in front of the CPU, this allows the computer to reboot and start fresh.
2. ***Troubleshooting System Sound Failure:*** Sound cased suddenly in an audio system of the computer, you may therefore need to check your speaker if it is connected properly, if no sound is coming up yet, you may need to examine if the volume is not set, set too low or if the mute button is not activated. Look closely to the right hand end of windows task bar, point to the speaker icon then DOUBLE CLICK. Raise the volume then deactivate the mute button, or from my computer, click on control panel, locate audio sound and do the settings as necessary.

3. ***Poor or no Picture on the Monitor:*** Patches can appear at the edges, just check if some magnetic materials such as speakers are not placed near the monitor, and remove such heavy metal once, you can also use the diagnose button in the utility software. If no picture at all, check if the monitor is switched OFF or if the signal cable is connected to the CPU, or check for the brightness if it is set at zero in monitors own control button. You may need to set resolution to a better state; click on START **>** CONTROL PANEL **>** then double click DISPLAY, set the resolution and colour appropriately.

4. ***Non System Disc:*** The hard disc can be filed up with unused files in the form of temporary and cookies files, these files have to be cleared to improve on the efficiency of the system.

   (a) Temp Folder**:**
   - (i) Find all the "TEMP" folder on the computer by opening the find features, then Start Button + Find + Files and Folders.
   - (ii) Type the word "TEMP" in the "named": box. Select "C" from the "look in box" then click the "Find now" button.
   - (iii) A list of folders and files with similar names will appear in the window. Double click "ONLY" on each folder named specifically "TEMP" and do the following to the contents within the temp folder
   - (iv) Highlight all the files (not the folders) that exist and press "DELETE.'' If a file won't delete, then skip that file.
   - (v) Empty the recycle bin.

   (b) Cookies Folder**:**
   - (i) Find the "COOKIES" folder on the computer by opening the find the find features: Start Button + Find + Files and Folders.
   - (ii) Type the word "COOKIES" in the "named": box. Select "C" from the "look in" box then click the "Find now" button.
   - (iii) A list of folders and files with similar names will appear in the window. Double click "only" on the cookies folder named specifically "COOKIES" and do the following to the contents within the cookies folder
   - (iv) Go to the edit pull down and select "SELECT ALL". Now press the delete key. All contents should delete. If a file won't delete, then skip that file.
   - (v) Empty the recycle bin.
   - (vi) Or better still pass through the Start > All Programme > Accessories > System Tools > Disc Clean.

5. ***Defragmentation:*** As we work on our computer system temporary files accumulates on the hard drive and may slow the functions of the system. Therefore to avoid such DEFRAGMENTATION is require which is the process of re-arranging files on the hard disc for better performance. Hard drives have cluster memories in which data are stored. At storage data fills a cluster, at an update of a file the data will have to occupy another cluster (making 2 cluster memories for an update data). Overtimes this may get accumulated and it will take longer time to read from each file which requires defragmentation.

   (a) Disc Defragment**:** This is the process of re-arranging fragment of a file on the hard disc on one location to thereby increasing the access, speed and free spaces for the better performance of the computer.

   (b) Procedure: Click the Start Button > Highlights the Programs > Then Accessories and System Tools> Then Disc Defragmenter.

6. ***Upgrading Computer System***: Upgrading is the process of enhancing or increasing the performance of a computer system, where some programs may need to be added, while some may need to be replaced with a new version of higher capacity, such as installing a newer version of Corel Draw or installing higher Ram with the existing one still in replace to boost speed and storage of the computer system.
   (a) Upgrading the Mother Goard**:** This is like building a new system from the scratch, where the following must be considered:
      (i) Will the new motherboard fit into the existing case?
      (ii) Will it support the previous component?
      (iii) The hard disk may need to be reformatted.
      (iv) Mother Board Upgrading may be necessary if:-
         - The work-volume is increasing and you have special application programs to run.
         - You want a faster system i.e. a mother board with high processor installed already

   (b) Upgrading the Hard Disk: Upgrading the hard disk with higher bytes, the new programs may not suffer delays on a hard disc capacity of 900MB while a hard disc of 5GB may be a good starting point for better output and in need of free spaces.

   (c) Upgrading Processor: A 300MHZ processor runs 300million times in a second thus accomplishing a certain task in a processor. A 500MHZ processor will certainly do more in a second, i.e. if works on a faster rate.

   (d) Upgrading Ram: Ram means Random Access Memory:- When a computer is switched OFF all data previously saved in the hard disk (C drive) remains there. These include the programs and files. When the system is switched ON, the operating system take over and this requires a volume of RAM to run. Capacity of Ram is measured in Megabyte, which exit in 16, 32, 64, 128, 256, 512Mb etc. Although Ram capacity depends on the system make up, but 128 MB is sounder.

   (e) Upgrading CD- Rom Drive: Data are stored on CD – Rom, soft ware are copied on it for installation through the CD. The CD – Rom drive spins to read and transfer data to the system. The spin speed varies, the faster the drive spins the faster it will transfer the data during installation. Some CD drives transfer data at the rate of 300kb per second. There exists CD – Rom (Read Only Memory), CD – RW (CD- Recordable) CD – RW (CD- Re-Writable).

   (f) Upgrading Graphic Cards: This generates pictures and the monitor displays such as pictures. The quality of pictures is called RESOLUTION and the standard for measuring monitor is called PIXEL. Pictures are made of tiny spots of light called PIXEL. Therefore Graphic cards that supports a resolution of 600 x 800 is an ideal one (600 rows x 800 Pixel). Advance graphical based system may go on 1600 x 1200 pixels.

   (g) Upgrading Sound Cards: This is required only to increase sound system where powerful speakers and woofers with an advanced sound card with special effects are needed. On the mother board, the point of installation of the sound card is the expansion slots to generate more sound and to record sound with the aid of microphone through the port.

7. ***Speeding up a Low Computer System:***
   - Restart the computer
   - Run fewer programs at a time
   - Remove virus and malware
   - Free up hard disc space
   - Verify window system files
   - Uninstall unnecessary programs
   - Adjust windows visual effects
   - Run a disc scan
   - Defragment the hard disc
   - Reinstall windows
   - Advance steps
   - Upgrade the hard wire

Purpose of the study

The purpose of the study was to determine the skill retraining competencies of technical college student in computer hardwire trouble schooling and maintenance for effective entrepreneurship. Specifically the study sought to:

1. Determine the skill retraining competencies of technical college students in computer hardware troubleshooting.
2. Determine the skill retraining competencies of technical college students in computer hardware maintenance.

Research questions

1. What are the skill retraining competencies of technical college students in computer hardware troubleshooting?
2. What are the skill retraining competencies of technical college students in computer hardware maintenance?

Methodology

The study used a survey research design, and to study was carried out in the three technical colleges of Gombe State which are; GSTC Gombe, GSTC Kumo and GSTC Kwami. The total number 161 respondents made up of 83 technical college teachers and 78 students were used. There was no sampling as to total of the population of 161 was okay as recommended by Tolubi, (1989). The instrument used in this study was a 5 points structured questionnaire based on Likert type rating scale that was validated by 2 experts in Technical College, Amada. The reliability of the instrument was determined at 0.95 coefficient alpha (Cronbach – Alpha). The instrunment was administered directly to the respondents by the researchers with help of 2 assistants. Data obtained were analysed using mean and standard deviation to answer the research questions. The analysis was carried out using SPSS to be able to take decision on each item. The real limits of numbers on the five point rating scale were used taking a cutoff point of 3.50 as recommended in Umar (2010).

Results

Table 1: Mean Response of the Respondents on Skill Retraining Competencies among the Technical College Students in Computer Hardware Troubleshooting Guide

S/N	Item Statement	$\overline{X}_T$	$\overline{X}_S$	$\overline{X}_C$	Remarks
1	Troubleshooting guide on power problems	3.59	3.78	3.68	Agreed
2	Troubleshooting on non system disc or disc error at boot	3.56	3.78	3.67	Agreed
3	Troubleshooting on poor or no picture	3.72	3.64	3.68	Agreed
4	Troubleshooting Blinking of to computer	3.57	3.50	353	Agreed
5	Troubleshooting on sound failure	3.54	4.01	3.77	Agreed
6	Troubleshooting computer system freezes	3.54	4.01	3.77	Agreed
7	Troubleshooting on blank monitor	3.56	3.59	3.57	Agreed
8	Troubleshooting on system overheating	3.63	4.20	3.91	Agreed
9	Troubleshooting guide on upgrading motherboard	3.50	3.87	3.68	Agreed
10	Troubleshooting guide on system upgrade	3.51	3.73	3.62	Agreed
11	Troubleshooting guide on VGA cards upgrade	3.60	4.21	3.90	Agreed
12	Troubleshooting guide speeding up a low system	3.57	3.51	3.54	Agreed
	Grand Mean	**3.57**		**3.45**	

Where: $\overline{X}_T$; $\overline{X}_T$ and $\overline{X}_C$ = Means of Teachers; Students and Combined respectively.

Results in Table 1 indicated that all the 12 items have been regarded Agreed by all the respondents as skill retraining competencies of technical college students on computer hardware troubleshooting guide.

Table 2: Mean Response of the Respondents on Skill Retraining Competencies among the Technical College Students in Computer Hardware Maintenance Practice

S/N	Item Statement	$\overline{X}_T$	$\overline{X}_S$	$\overline{X}_G$	Remarks
1	Maintenance practice on managing hard drive space	3.54	4.31	3.93	Agreed
2	Maintenance practice on scanning for system errors	2.22	2.09	2.15	Not Agreed
3	Maintenance practice on defragmenting the hard drives	3.50	3.55	3.52	Agreed
4	Maintenance practice on virus protection and malware	2.18	1.68	1.91	Not Agreed
5	Maintenance practice on monitor clean up	3.80	4.31	4.05	Agreed
6	Maintenance practice on keyboard clean up	3.60	4.16	3.88	Agreed
7	Maintenance practice on mouse clean up	3.59	4.24	3.91	Agreed
8	Maintenance upgrading drives and running a disc scan	3.60	4.43	4.01	Agreed
9	Maintenance reinstalling adjusting system's visual effect	3.60	4.08	3.84	Agreed
10	Maintenance on installing and reinstalling	3.54	4.17	3.86	Agreed
	Grand Mean	**3.83**		**3.70**	

Where: $\overline{X}_T$; $\overline{X}_T$ and $\overline{X}_C$ = Means of Teachers; Students and Combined respectively.

Results in Table 2 indicated items 2 and 4 were Strongly Agreed, while all the other 8 items have been regarded as Agreed by all the respondents as skill retraining competencies of technical college students on computer hardware maintenance practice.

Findings and discussion

The questionnaire items on Table 1 are considered as the practical skill retraining competencies needed in computer hardware troubleshooting for technical college students, because majority of the respondents do agreed upon the items and their grand mean values is above 3.50. The questionnaire items in Table 2 are also considered the practical skill retraining competencies needed in computer hardware maintenance programme for technical college students for effective entrepreneurship, because majority of the respondents do solemnly agreed with the items where the grand mean values also exceed 3.50.

Conclusion

The conclusions made based on the result of the study is that practical skill retraining competencies needed in computer hardware troubleshooting and maintenance for technical college students towards effective entrepreneurship are highly encouraged and needed for the students to fit into the world of work and becomes self reliant by creating job opportunities among the students.

Recommendations

Technical college stakeholders should encourage in retraining of practical skills in computer system hardware maintenance practices and troubleshooting guide to technical college students, this would help the students to become fully entrepreneurs for self reliance. Ministry of education in collaboration with National Board for Technical Education (NBTE) should encouraged in organizing seminars, workshops, conferences, and short courses to technical college students and their teachers in practical retraining of computer system hardware troubleshooting guide and maintenance practices. This would help both the students and teachers to be acquainted with the knowledge and become fully entrepreneurs.

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DIGITAL ENTREPRENEURSHIP SKILLS NEED OF TVET UNDERGRADUATES IN THE ERA OF COVID-19 PANDEMIC

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Abstract: *The main purpose of the study was to determine the digital entrepreneurship skills need by TVET undergraduates and the challenges of acquisition and application of these skills in the era of COVID 19 pandemic. Based on these objectives, two research questions were raised and two null hypotheses were raised to guide the study. The research design was a survey research design, the area of the study is Bauchi state, with the main focus was on TVET undergraduates students the population of students and lecturers was found to be 228, the entire population was used for the study. The instrument for data collection was, Digital Entrepreneurship Skills (DES) questionnaire. was validated by experts, while it is reliability was found to be 0.87, the instrument for data analysis involve the use of mean, standard deviation and independent sample t test of significant to test the postulated null hypotheses at 0.05 level of significance, the study found that best digital entrepreneurship skills needed by TVET is to understand the necessity and learn how to develop a digital entrepreneurial mind-set throughout ventures among entrepreneurs and their teams and get to know a structured approach to test the venture idea and see examples of different minimum viable products to inspire the testing process are the major digital entrepreneurial skills needed by TVET students and recommended that Government should close the digital divide through educational programs in universities emphasis on TVET students Improving the digital infrastructure, such as providing 5G Internet infrastructure, and introducing and legalizing the "e-signature.*

Keywords: *TVET, Digital Entrepreneurship, Skills Need, COVID 19 Pandemic*

Introduction

The world today experience a high proliferation in all field of life by changing drastically especially in information and communication technologies (ICT). In this scenario, the speedy increase of digital technologies with new innovative functionalities is transforming competitive environments, modifying general entrepreneurial approach and business strategies, structures and procedures (Bharadwaj, *et al.,* 2013). This brings about what is called today as digital entrepreneurship. Digital entrepreneurship is reshaping business and communication with the transformation by the advance of new digital technologies such as the Internet of Things, Block-chain, Artificial Intelligence, Big Data, Cloud Computing, Next-generation Wireless Networks and more. Each of these is enabled by dramatic increases in computing power and a simultaneous decline in its cost. Zaheer, *et al.,* (2019) stated that entire entrepreneurial process can focus on a digital venture as the content of an entrepreneurial journey, Digital entrepreneurship holds potential not just for the wealth of entrepreneurs and organisations but society as well through its close connection to sustainable, development goals (Mariusz, *et al.,* 2021). This benefit from certain features of digital technologies for business creation and growth, including the lower start-up costs required for many digital businesses and the wider access to external markets offered by the internet. Thus this opportunity requires not a simple and native approach but sophisticated digital skills to conform to the need of modern society especially during COVID 19 where digitalisation is the only survival approach in all perspective. Digital transformation in relation to entrepreneurship is radically altering the way businesses function and organise production. Which involve the participation of those with small, medium and small scale manufacturing and non-manufacturing industries, which is a result and function of Technology Vocational Education and Training (TVET), (European Commission, 2018). Digital entrepreneurship is a sub group of entrepreneurship which involves digitalization methods in the functioning of its activities. Hence, digital entrepreneurship is related to digital business activities along with some digital goods and services.

Entrepreneurship has been identified as one of the key drivers of economic prosperity and is therefore considered a reasonable vehicle with which to help emerging economies grow and overcome the major challenges posed by poverty in developing countries (Kimmitt, *et al.,* 2019). In view of this digital entrepreneurship is a sub-category of entrepreneurship in which some would be physical in a traditional organization has been digitized. Thus, digital entrepreneurship implies entrepreneurial activities associated with some degree of digital goods or services, or with other forms of digital activity, given the rapid rise of digital activities among all firms. it seems likely that digital entrepreneurship will become more and more common, suggesting a need for a deeper understanding of this phenomenon. Federal Republic of Nigeria (2013) stated that TVET is used as a comprehensive term refereeing to those aspects of educational process involving in addition to general education, the study of technologies and related sciences and acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. The goal of TVET shall be to

a) Provide trained manpower in the applied sciences, technology and business particularly at craft, advance craft and technical levels
b) Provide the technical knowledge and vocational skills necessary for Agriculture, commercial and economic development; and
c) Give training and impart the necessary skills to individuals for self-reliance economically. Thus TVET students are expected to conform with the above mentioned objectives by being highly skilled in digital entrepreneurship to conform with ability to be self-reliance in 21st century technology era inflicted by the COVID 19 pandemic

COVID-19 has impacted life around the globe for most of 2020. It has caused a global health, economic and social crisis whose impact is likely to be felt for generations to come. It has also demonstrated the vital role of digital technologies. With a significant share of the population being confined at home during various periods of the pandemic, the need for good Internet connectivity, appropriate digital tools and digital skills to use those tools has surfaced rapidly. A large number of activities related to work, school/education, caring, shopping, socializing and other pastimes, among others, moved from the physical to the virtual world. Internet-based companies such as Amazon, Zoom, Netflix and TikTok experienced record growth in sales and customer base, although others such as travel and transport- related platforms faced a steep decline.

This accelerated digital transition also revealed the challenges that still exist when it comes to connecting households and people, and the digital skills required to participate effectively in the online world – particularly in developing countries. With 90% of schools closed and 1.6 billion children out of school during the pandemic, many educational institutions, teachers and pupils/ students were confronted for the first time with remote teaching and online learning as the only way to continue education (UNESCO, 2020). Organization estimates, workplace closures in the second quarter of 2020 resulted in the loss of 305 million jobs worldwide and 94% of the global workforce was affected due to COVID-19. It has hit those in precarious jobs hardest, this also open the gate for digital entrepreneurship in the world. In many developing countries, no teaching and learning took place at all due to insufficient or costly Internet access, lack of computers or laptops, and lack of remote teaching facilities and abilities, among others. This necessitate the other part of the research which will solicit data on the problems that hinder the proper acquisition of digital entrepreneurship skills. Students today are the millennial generation born when the world has become a very digital and urban (1989-2020). This generation is an individual who grow and develop with technology that is increasingly advanced and easier for people to do the job. Individuals learn, work, write and interact with each other in very different ways. (Elia, *et al.,* 2020), when they entrepreneurship millennial generation who become entrepreneurs have the opportunity to succeed on a large scale because people know that the digital world as it is today is very good for the growth of their business. Individuals know how to thrive in it, people know that friends and many people living with a variety of existing technology facilities and the individual knows how to exploit the trend in today's digital era.

Statement of the problem

There are many gaps in digital entrepreneurship among TVET students which are due to many factors, which including a lack of digital entrepreneurship role models and a lack of digital skills, which affects their chances of being part of modern entrepreneurs. Moreover, several recent studies show that many obstacles to business creation (e.g. lack of skills, access to finance, small and ineffective networks) carry over into the digital economy. Data on computer usage clearly show that students, TVET inclusive thus they have gaps in basic digital skills, as do some groups of youth at all level of education. These skills barriers reinforce the difficulties to start-up financing and networks. Even before the pandemic broke out, the digital skills gap existed and demand for digitally skilled students/graduates with high across all levels of skills (basic, intermediate and recent studies by different regional and global organizations that try to capture the digital skills gap and the shortage of digital entrepreneurs and digital skilled workers on the labour market. In view of the above problems it is pertinent to determine the digital entrepreneurship skills need by TVET undergraduates in the era of COVID 19 pandemic as they it deals with modern skills acquisition in a critical situation of avoiding public gathering and interactions and contacts. (Siva, 2018)

Objectives of the study

The main purpose of the study was to determine the digital entrepreneurship skills need by TVET undergraduates and the challenges of acquisition and application of these skills in the era of COVID 19 pandemic. The specific objectives of the study were:

1. To determine the digital entrepreneurship skills need by TVET undergraduates in the era of COVID 19 pandemic.
2. To determine the factors preventing the acquisition of digital entrepreneurship skills by TVET undergraduates in the era of COVID 19 pandemic

Research questions

1. What are the digital entrepreneurship skills need by TVET undergraduates in the era of COVID 19 pandemic?
2. What are the factors (challenges) preventing the acquisition of digital entrepreneurship skills by TVET undergraduates in the era of COVID 19 pandemic?

Hypotheses

H_{O1}: There is no significant difference in the mean responses of both students and lecturers on the digital entrepreneurship skills need by TVET undergraduates in the era of COVID 19 pandemic.

H_{O2}: There is no significant difference in the mean responses of both students and lecturers on factors (challenges) preventing the acquisition of digital entrepreneurship skills by TVET undergraduates in the era of COVID 19 pandemic.

Methodology

The research design was a survey research design, the area of the study is Bauchi state, with focus on TVET final year undergraduates and their lecturers during the 2020/2021 academic year at Abubakar Tafawa Balewa University. Their population was 171 TVET undergraduates students and 57 TVET lecturers all from the department of Vocational and Technology Education, thus the population of students and lecturers was found to be 228, the population will be used for the study in order to ensure accurate of result, help in generalisation of the findings of the results, reduce sampling error and bias to the minimum, reduce the tendency of committing typed II error and control some moderator variable such as age and gender, and entry mode. The instrument for data collection was, Digital Entrepreneurship Skills (DES) questionnaire adapted from Mariusz, *et al.,*

(2021). The questionnaire has 15 items and it was measured on five point scale, Very Highly Needed (VHN) , Highly Needed, Needed (HN), Slightly Needed (SN), Needed (ND), Not Needed (NN), while the other part of the questionnaire which has o do with the factors that hinder the proper acquisition of the digital was measured on five point scale as strongly agree (SA) Agree (AG) Undecided (UN) Disagree(DA) Strongly Disagree(SD) the instrument was validated by experts, while it is reliability was found to be 0.87 which is higher reliability, the instrument for data analysis involve the use of mean, standard deviation for research questions while independent sample t test of significant to test the postulated null hypotheses at 0.05 level of significance.

Results

Table 1: Digital Entrepreneurship Skills Need by TVET Undergraduates in the Era of COVID 19 pandemic

S/N	Items	N_S	$\bar{X}_S$	SD_S	N_L	$\bar{X}_L$	SD_L	$\bar{X}_{SL}$	Dec.
1	Understand the necessity and learn how to develop a digital entrepreneurial mindset throughout ventures among entrepreneurs and their teams	171	3.80	0.80	57	3.50	1.00	3.71	HN
2	Explore how to support creativity through the use of artificial intelligence, virtual reality and the Internet of things, thereby encouraging entrepreneurs and their teams to make connections, develop ideas, create meaning, collaborate and communicate	171	3.60	0.90	57	3.50	0.80	3.56	HN
3	Understand how technologies and management methods must be implemented in destination management organisations so that they generate sustainable competitive advantages and customer benefits	171	3.60	0.96	57	3.50	0.96	3.60	HN
4	Get to know a structured approach to test the venture idea and see examples of different minimum viable products to inspire the testing process	171	3.70	0.95	57	3.60	1.00	3.70	HN
5	Learn how to test the specific dynamics of platform business models and how to develop a minimum viable platform through different approaches	171	3.80	0.78	57	3.40	0.92	3.64	HN
6	Explore how to use block-chain to provide security during online consulting	171	3.60	1.00	57	3.70	0.83	3.67	HN
7	Learn how to apply artificial intelligence-enhanced business models in digital entrepreneurship	171	3.70	1.00	57	3.70	0.98	3.73	HN

S/N	Items	N_S	$\bar{X}_S$	SD_S	N_L	$\bar{X}_L$	SD_L	$\bar{X}_{SL}$	Dec.
8	Explore how to implement digital transformation content through their entire entrepreneurial activities	171	3.40	1.10	57	3.60	0.98	3.58	HN
9	Delve into how to incorporate creativity in the fabric of digital enterprise processes to promote greater innovation	171	3.40	1.10	57	3.60	1.00	3.52	HN
10	Test the conceptual framework of corporate digital entrepreneurship highlighting three elements: business model transformation, operating model transformation and cultural transformation	171	3.70	0.83	57	3.50	1.00	3.61	HN
11	Investigate how to engage new sources of entrepreneurial financings, such as crowd funding and token offerings	171	3.60	0.91	57	3.50	1.00	3.56	HN
12	Apply criteria for entrepreneurs' proposals for digital innovation and learn how to create and nurture the culture supporting digital entrepreneurship	171	3.60	0.93	57	3.50	0.94	3.61	HN
13	Use a roadmap to the interaction of digitalisation and international opportunity	171	3.40	0.94	57	3.60	0.93	3.55	HN
14	Examine how to improve the current online infrastructure for digital entrepreneurs	171	3.70	0.89	57	3.50	0.98	3.62	HN
15	Understand the necessity and potential for digital entrepreneurship on the Sustainable Development Goals in the Decade of Action and learn how to develop the venture accordingly	171	3.60	1.00	57	3.60	1.00	3.66	HN

Key: N_S = Number of students, $\bar{X}_S$ = mean of students, SD_S =standard deviation of students, $\bar{X}_{SL}$ = Man of both students ans lecturers, N_L = Number of lecturers, $\bar{X}_L$ = mean of lecturers SD_L = standard deviation of Lecturers, Dec = Decision, HN = Highly Needed

Table 1 present the result of research question one, the table revealed that all the items were highly needed from both the TVET students and their lecturers, with item 1 and 4 having the highest mean of 3.71 and 3.70 respectively and considering the standard deviation of all the two groups across all the items which fall within the same range indicated that their mean responses do not vary much

Table 2: Factors (Challenges) Preventing the Acquisition of Digital Entrepreneurship Skills by TVET Undergraduates in the Era of COVID 19 Pandemic

S/N	Items	N_S	$\bar{X}_S$	SD_S	N_L	$\bar{X}_L$	SD_L	$\bar{X}_{SL}$	Dec.
1	Inaccessibility to the necessary funds, due to the scarcity of venture capital markets and "business angels"	171	3.77	0.91	57	3.71	0.84	3.74	AG
2	Lack of policies and regulations that protect and support e-commerce and digital entrepreneurs	171	3.84	1.00	57	3.52	0.98	3.68	AG
3	Weak digital infrastructure	171	3.81	0.90	57	3.63	0.94	3.72	AG
4	Defciency in digitally competent and experienced labour capital	171	3.83	0.92	57	3.54	0.93	3.68	AG
5	Lack of online payment systems	171	3.76	0.95	57	3.61	0.99	3.69	AG
6	Cultural differences among target audiences in the country	171	3.79	0.93	57	3.68	0.98	3.73	AG
7	Weak institutional structures and corruption	171	3.64	0.94	57	3.61	0.98	3.62	AG

Key: N_S = Number of students, $\bar{X}_S$ = mean of students, SD_S =standard deviation of students, $\bar{X}_{SL}$ = Man of both students ans lecturers, N_L = Number of lecturers, $\bar{X}_L$ = mean of lecturers SD_L = standard deviation of Lecturers, Dec = Decision, HN = Highly Needed

Table 2 present the result of research question two, the table revealed that all the items were agreed from both the TVET students and their lecturers, with item 1 and 6 having the highest mean of 3.74 and 3.73 respectively and considering the standard deviation of all the two groups across all the items which fall within the same range indicated that their mean responses do not vary much

Table 3: Independent Samples Test of DES of TVET Students and Lecturers

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DES	EVA	.421	.522	1.549	226	.133	.06133	.03960	-.01978	.14245
	EVNA			1.549	25.780	.134	.06133	.03960	-.02010	.14277

DES:Digital Entrepreneurial Skills

An independent-samples t-test was conducted to compare the TVET students and lecturers mean responses on the digital entrepreneurship skills need by TVET undergraduates in the era of COVID 19 pandemic. There was no significant difference in scores for students $M = 34.02$, $SD = .567$) and lectures ($M = 33.17$, $SD = .782$; $t(226) = 1.54$, $p = 1.33$, two-tailed).

Table 4: Independent Samples Test of DEC of TVET Students and Lecturers

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DEC	EVA	.038	.849	4.488	226	.001	.16286	.03629	.08379	.24193
	EVNA			4.488	11.9	.001	.16286	.03629	.08378	.24193

DES:Digital Entrepreneurial Skills

An independent-samples t-test was conducted to compare the TVET students and lecturers mean responses on the digital entrepreneurship skills need by TVET undergraduates in the era of COVID 19 pandemic. There was significant difference in scores for students M = 3.36, SD = .671) and lectures (M = 3.71, SD = .700; t (226) = 4.488, p = .001, two-tailed).

Major findings of the study

1) Understand the necessity and learn how to develop a digital entrepreneurial mind-set throughout ventures among entrepreneurs and their teams and Get to know a structured approach to test the venture idea and see examples of different minimum viable products to inspire the testing process are the major digital entrepreneurial skills needed by TVET students but there is no significant difference between students and lecturers mean responses.
2) Inaccessibility to necessary funds, due to the scarcity of venture capital markets and "business angels and cultural differences among target audiences in the country were the challenges in the acquisition and application of digital entrepreneurship among TVET students but there is significant difference between students and lecturers responses

Discussion of findings

Based on the major findings of the study the results indicated that the students in TVET require these skills to fit in the world of work effectively especially in this 21 st century technological era inflicted by COVID 19, from the literature and based on the limitation of the study which is restricted to only final year students and in only one university shades more light of what digital entrepreneurship skills are needed, those skills are complex which require educational institutions to included them in curriculum, if at all are not existing. As they were needed before the COVID 19 and their need increase and will keep on escalation after the COVID 19, As they simplify and expand opportunities for young entrepreneurs, the challenges mentioned indicated that government need to improve all the existing ICT in universities to ensure that students are ready to conform with the challenges of modern society for entrepreneurial development, thus digital should replace the traditional approach to entrepreneurships. The entire findings conform with the claim of some researchers especially Elia, *et al.,* (2020) who expressed in his study that Students today are the millennial generation born when the world has become a very digital and urban (1989-2020). An individual who grow and develop with technology that is increasingly advanced and easier for people to do the job. Individuals learn, work, write and interact with each other in very different ways. Individuals know how to thrive in it, people know that friends and many people living with a variety of existing technology facilities and the individual knows how to exploit the trend in today's digital era. tudents are expected to take advantage of the opportunities that exist in the vicinity of creating their own businesses after graduation as well as a lecture, it is necessary to note the skill of digital literacy of students in participating in entrepreneurship courses so that later they were able to compete and take the benefits of the digital age.

Recommendations

1. Filling the digital skills gap through educational programs in universities emphasis on TVET students Improving the digital infrastructure, such as providing 5G Internet infrastructure, and introducing and legalizing the "e-signature".
2. Introducing online payment systems, taking measures that fi ght corruption and ensure equal opportunity and legitimate competition, encourage funding through both the public sphere and private channels.

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EFFECTIVENESS OF ENTREPRENEURSHIP EDUCATION IN TERTIARY TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN THE ERA OF COVID-19 PANDEMIC

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Abstract: *The study determined the effectiveness of entrepreneurship education in TVET in the era of COVID-19 pandemic. Two research questions were formulated to guide the study. The study adopted a survey research design. The population of the study was made up of 20 subject consisiting of all the 15 lecturers in the Department of Industrial and Technology Education and 5 lecturers in the Department of Education Technology, School of Science and Technology Education, Federal University of Technology, Minna, Niger State. The instrument used for data collection was a structured questionnaire. Mean and standard deviation (SD) were used to analyzed data collected. The study found out that these factors: teaching method, lack of career counselling, outdated curriculum, lack of motivation and so on moderately caused the ineffectiveness of entrepreneurship in TVET. These teaching methods: Zoom/google meet in lecture delivery; Video tape instruction; Blended Learning; Podcast, Vodcast e.t.c., can effectively enhance entrepreneurship in TVET in this era of COVID-19 pandemic. Based on the findings of this study, it was recommended among others that, the government should make electronic devices available in every technical college for teaching. There should be training and retraining of technical educators on distance learning in using the available electronic devices.*

Keywords*: Technical Vocational Education and Training, Effective Entrepreneurship, COVID-19 Pandemic*

Introduction

The Nigeria's philosophy of education is based on the belief that education is an instrument for national development and social change; education is vital for the promotion of a progressive and united Nigeria; education maximize the creative potentials and skills of the individual for self-fulfillment and general development of the society; education is the compulsory and a right of every Nigerian irrespective of gender, social status, religion, colour, ethnic background and peculiar individual challenges; and education is to be qualitative, comprehensive, functional and relevant to the needs of the society (Federal Republic of Nigeria, 2013). Consequently, the national policy on education has put in place the Post-Basic Education and Career development (PBECD). The PBECD comprises of senior secondary education, higher school and continuing education in Vocational Enterprise Institutions (VEIs). The technical and vocational education and training (TVET) in Nigeria is set up to give equal opportunities for students to learn and become self-reliant, Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development among others. Okoye and Chijioke (2013) defined TVET as the form of education that advocates development of the head, training of the hand and enriching the heart. TVET is understood as comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods. TVET shall cover the following: Technical college; Vocational Enterprise Institution (VEIs) and National Vocational Qualifications Framework (National Board for Technical Education, 2011).). The main features of TVET at technical college level shall be structured in foundation and trade modules and the curriculum for each trade shall consist of five components: General education, theory and related courses, workshop practice, industrial training/production work and entrepreneurial training. Trainees completing technical college programmes shall have three options: secure employment either at the end of whole course or after completing one or more modules of employable skills, set up their own businesses and become self-employed and be able to employ others and pursue further education i. Each programme or modules at technical colleges consists of entrepreneurial training which is an indication that the achievement of any of the goal of TVET at technical college level depends fully on the entrepreneurship knowledge of the students. Without entrepreneurship skills, one cannot be self-employed or be employable.

Entrepreneurship is the process of planning, creating, evaluating and exploitation of the available opportunities to produce goods and services for the purpose of making profit. Barzelogna (2021) defined entrepreneurship as "a process used to develop new businesses, products, services or processes inside of an existing organization to create value and generate new revenue growth through entrepreneurial thought and action." Entrepreneurship refers to an individual's ability to turn ideas into action (Maigida, *et al.,* 2013). Hence, it is clear that for an individual to become a successful entrepreneur, there are different skills to learn and master both the theoretical skill and practical skills which are referred to as entrepreneur competency. Entrepreneurial competences can be viewed as a mix of knowledge, skills and right attitudes, including self-confidence, networking, understanding risk, working with others, creativity, a sense of initiative, problem-solving, the ability to marshal resources, financial and technological knowledge (McCallum, 2019). From the above entrepreneurial competencies, it is revealed that for one to become a successful entrepreneur in his field or vocation there are a lot to learn from technical colleges. In other world, the entrepreneurial training in TVET have to be effective. Prior to the outbreak of pandemic there are several reports that the TVET graduates especially the aspect of entrepreneurial training are weak in terms of practical skill and are less employable by the industries (Fiala, 2014). Kissi, *et al.,* (2020) noted that the TVET graduates often have limited entrepreneurial skills and rarely undertake entrepreneur initiatives as they are persistently in search of non-existing jobs in the formal sector. The advent of COVID-19 pandemic has exposed every sectors, especially the entrepreneurship in TVET as not being effective as supposed. International Labour Organization (ILO) in Neal (2020) report noted that 188 million people in the world were seeking employment, and that 285 million people had either given up searching for work or did not have enough work. It is no longer a gain saying that the entrepreneurial training at technical colleges is ineffective.

The outbreak of COVID-19 has affected virtually every sectors of the human kind. According to Neal (2020) explained that the ongoing COVID-19 pandemic has substantially affected education and training sectors worldwide in two ways: Institutional level and Systemic level. At the institutional level, the Lockdown measures have led to the worldwide closure of TVET institutions and skills development organizations. As distance education and training becomes the norm, the ability of TVET institutions to implement such system depends on their capacity to adapt curricula as well as the preparedness of trainers and teachers. While at the systemic level the economic recession triggered by the COVID-19 crisis is causing a massive rise in unemployment and under-employment that could have a lasting impact on essential livelihoods. Transformations in the labour market will also result in changes in skills demands. TVET systems need to address the short- and medium-term impact of the current pandemic by not only scaling up TVET solutions but also formulating responses that reflect long-term sustainability and effective.

Effectiveness is the ability of producing an anticipated result or the ability to produce desired output. When the entrepreneurship in TVET is effective, it will help to be self-employed, create jobs for others to boost the economy and to safeguard the well-being of others. To be an effective and meaningful entrepreneur, the practical aspect of the entrepreneurial training has to be taught at technical college level with the experienced technical educators, relevant and updated resource. This was also resounded in the works of Omar, *et al.,* (2021) who carried out a study on embedding entrepreneurial knowledge in vocational college curriculum: A case study of the competency of TVET instructors, revealed that in order to achieve the goal of TVET, vocational college teachers must be the ones with the highest quality, competency, responsibility, and professionalism in performing their duties. With the effect of COVID-19, it has called for the shift from the traditional ways of imparting the entrepreneurship knowledge to the students in TVET. There is need to improve the level of entrepreneurial teaching and learning in technical colleges so that the goals of 21st century education can be successfully achieved. To overcome these challenges, the digital teaching and learning of entrepreneurship in TVET is inevitable. In chosen any type of electronic device, there is need to put into consideration the types of teaching and learning that will be carried out because the entrepreneurial training involves the practical skill which may not be easily blended into the electronic device.

Types of teaching methods that could be use in this era of COVID-19 pandemic for effectiveness of entrepreneurship in TVET is student centred method that embraces e-learning or digital technology learning because they have been used by different researchers in different fields, such as: video tape instruction, video conferencing, blended learning, Edublogs, web-bases instruction, microblogs instruction and many more (Balogun, *et al.,* 2019; Gambari, *et al.,* 2018; Josef & Nataliia, 2019; Omar, *et al.,* 2021). The researchers believe that the best teaching instrument needed for an entrepreneurship in TVET should be the one that is flexible which is capable to impart the necessary skill in them and prepare them to face any change that may occur in the nearest future. With the proper teaching and learning of entrepreneurial subjects students will be well equipped before they enter into the workforce. The alternative ways for every student in Nigeria to acquire practical and relevant skill is to give every student opportunity to choose their career of interest from the available education system. To provide lasting solution to the teaching and learning of entrepreneurship, the researchers find out the causes of ineffectiveness of the entrepreneurship in TVET and to enhance the teaching and learning of entrepreneurship in TVET in the era of COVID-19 pandemic that will not deter its aim and objectives.

Research questions

1. What are the factors responsible for ineffectiveness of entrepreneurship education in Tertiary TVET Institutions in Niger State?
2. What are the teaching methods that can enhance effectiveness of entrepreneurship education in tertiary TVET Institutions in Niger State in the era of COVID-19 pandemic?

Methodology

This study adopted a survey research design. This design enables the researchers to describe the attitudes, opinions, behaviours or characteristic of the population based on data collected from a sample of the Industrial and Technology Education Department and Education Technology Department in Federal University of Technology, Minna, Niger State on the effectiveness of entrepreneurship in TVET in the era of COVID-19 pandemic. The study was carried out in Federal University of Technology, Minna, Niger State, Nigeria. The population of the study was made up of all the 20 lecturers in the Department of Industrial and Technology Education and Education Technology Department, Federal University of Technology, Minna, Niger State. The instrument used for data collection was a structured questionnaire. The questionnaire was designed to generate data for answering the research questions of the study. All the questionnaires administered were returned representing 100% return rate. The data collected for the study was organized and analysed on the basis of the research questions. SPSS version 23 was used for the analysis. Decisions on the research questions were based on the resulting mean score interpreted relative to the concept of lower and upper limits of real numbers as shown in Table 1. The standard deviation was used to decide on the closeness or otherwise of the respondents to the mean in their responses. Any item with standard deviation of less than 1.96 indicated that the respondents were not too far from the mean or from one another in their responses and any item having standard deviation equal or above stated value signified that respondents were too far from the mean.

Table 1: Interpretation of Four Point Scale

S/N	Scale of Research Question	Scale of Research Question	Point
1	Strongly Agreed	Strongly Effective	3.50 – 4.00
2	Moderately Agreed	Effective	2.50 – 3.49
3	Agreed	Moderately Effective	1.50 – 2.49
4	Disagreed	Not Effective	0.50 – 1.49

Results

Table 2: The Mean Response of the Respondents on Factors Responsible for Ineffectiveness of Entrepreneurship Education in Tertiary TVET Institutions in Niger State

S/N	Item	Mean	SD	Decision
1	Lack of effective communication	2.33	1.13	A
2	Inadequate and outdated infrastructure	2.60	0.64	MA
3	Lack of motivation	2.60	0.74	MA
4	Government passive attitude on TVET	3.47	0.92	MA
5	Outdated curriculum	2.73	1.03	MA
6	Lack of technology devices to teach the students	2.80	0.42	MA
7	Lack of qualified technical educators to teach the subject	2.67	1.29	MA
8	Lack of career counselling	1.73	0.46	A
9	Teaching method adopted	3.10	0.92	MA
	Grand Mean	**2.67**		MA

Keys: MA= Moderately Agreed; A= Agreed; SD= Standard Deviation

Table 2. shows that respondents agreed with items 1 and 8 as factors responsible for ineffective of the entrepreneurship in TVET with the means of 1.73 and 2.33. Items 2, 3, 4, 5, 6, 7 and 9 with the mean values range from 2.60 to 3.47 signify that the respondents moderately agreed the factors responsible for ineffective of entrepreneurship in TVET. The total grand mean is 2.67 which means these factors are responsible for ineffectiveness of entrepreneurship in TVET at moderate level. Since the standard deviation of the respondent on the factors responsible for ineffectiveness of entrepreneurship in TVET are less than 1.96, it is an indication that the respondents were not too far from the mean or from one another in their responses.

Table 3: The Mean Response on the Teaching Methods that can Enhance Effectiveness of Entrepreneurship Education in TVET in the Era of COVID-19 Pandemic

S/N	Item	Mean	SD	Decision
1	Blended Learning	3.32	0.80	E
2	Video tape instruction	2.71	1.13	E
3	Video conferencing	2.53	0.95	E
4	Mobile electronics response system	2.90	0.79	E
5	Zoom/google meet in lecture delivery	3.45	0.75	E
6	Computer aided concept cartoon	2.76	1.03	E
7	Peer learning	2.41	0-83	ME
8	Television/Radio teaching	2.50	1.00	E
9	Self-directed/self-instruction	2.25	0.95	ME
10	Podcast and Vodcast	3.35	0.81	E
11	Web-based instruction	3.33	0.73	E
12	EduBlogs	2.17	1.04	ME
13	Microblogs instruction (Facebook, WhatsApp, Twitter etc)	2.10	0.91	ME
	Grand Mean	**2.75**		**E**

Keys: ME= Moderately Effective; E= Effective; SD= Standard Deviation

Table 3 shows that the respondentshave agreed with items 1, 2, 3, 4, 5, 6, 8, 10 and 11 as effective in enhancing teaching and learning of entrepreneurship in TVET with the mean range from 2.50 to 3.45. Items 7, 9, 12 and 13 with the mean values range from 2.10 to 2.41 signify that the respondents agreed that those teaching methods are moderately effective when used to teach entrepreneurship in TVET. The total grand mean is 2.75 which means these strategies could be used to enhance teaching and learning of entrepreneurship in TVET in this era of COVI-19 pandemic. It is revealed that the respondents were not too far from the mean or from one another in their responses since the standard deviation of the respondent on the teaching methods that can enhance effectiveness of entrepreneurship education in TVET in the era of COVID-19 pandemic are less than 1.96.

Findings

1. The factors listed moderately caused the ineffectiveness of entrepreneurship education in TVET.
2. The teaching methods listed can effectively enhance entrepreneurship education in TVET in this era of COVID-19 pandemic.

Discussion of findings

Ineffectiveness of entrepreneurship in TVET mean that the programme is not achieving the expected result. The aim and objective of TVET is cleared on the national policy on education. The TVET is set up to reduce the unemployment in the society and enable every child or students that graduate from any level of TVET should be self-employed or be employed by other. The above stated objective is only feasible when the entrepreneurship education in TVET is effective. Ineffectiveness of entrepreneurship in TVET was attributed to: lack of effective communication, lack of infrastructure, lack of motivation, lack of career counseling, lack of qualified technical educator and many more as revealed in table 2. The better the teacher in terms of knowledge, skills and method of teaching adopted the better the outcome (learning and performance). To be a qualified technical educators it is not by obtaining NCE (Tech), B.Tech with education or B.ed with TRCN certificate, but it is about knowing the practical, understand what is obtainable in the society. For effectiveness of entrepreneurship in TVET, there is need for qualified and skilled technical educators for effective teaching and learning. In agreement with this study, Ismail and Abiddin (2014) revealed that in TVET due to the shortage of qualified teaching staff, many teaching staff are hired directly after study in university or college based on their academic qualifications without considering their skills. Omar, *et al.,* (2021) also supported the study by saying that in order to achieve the goal of TVET, vocational college teachers must be the ones with the highest quality, competency, responsibility, and professionalism in performing their duties. Further stressed that the vocational colleges might suffer from a lack of qualified instructors.

Lack of career counseling has also contributed to the low effectiveness of entrepreneurship in TVET in Nigeria. When students are not properly guided to choose the right career they end up choosing the wrong ones which may not be good for them. For instance, a child that is good in electrical work may end up in wood work. Such students will not be motivated to put in his effort and work hard. Such student may end up not using that certificate or knowledge acquired at technical college for any good course. He will then go out of school there by saying school/education is a scam discouraging others. Some parent's belief that TVET institution is for low IQ student, or for those that could not perform in the regular education system are the ones attending the TVET education. Therefore, students in the technical colleges are looked down at wherever they find themselves simply because, their mind have been poisoned. Ineffective career counselling for TVET students can affect their choice of career which in turn contribute to their behaviours that is lack of motivation in acquiring the entrepreneurship knowledge needed for the world-of-work. In support of this study, Yeap, *et al.,* (2021) revealed that career counselling is important for students and parents to explore and guide students in choosing their professional career based on their strengths, weaknesses, resources and opportunities. With this, students will be motivated and be proud of their chosen career.

To enhance the effectiveness of entrepreneurship in TVET is to improve its value, quality or attractiveness. It was revealed by different researchers all over the world that entrepreneurship in TVET lacks effectiveness which has been calling for enhancement. But with the outbreak and the effect of COVIC-19 pandemic, there is urgent needs for enhancement from different dimensions. One of the best way to enhance the teaching and learning of entrepreneurship in TVET is through the distance learning or digital teaching and learning method adopted in this era of COVID-19 pandemic. Such as: blended learning (augmented reality, virtual reality), Video tape instruction, Video conferencing, Zoom/Google meet in lecture delivery, Computer aided concept cartoon, Podcast and Vodcast, Web-based instruction and many more as revealed in table 3. The result shows that these teaching methods are effective which is an indication that they can be used to enhance the effectiveness of entrepreneurship in TVET in this era of COVID-19 pandemic. This finding was further strengthened by the study of Josef and Nataliia (2019) on the application of digital tools for the development of entrepreneurship competencies who revealed that when entrepreneurial digital learning environment (EDLE) is integrated with face-to-face learning, it will form a modern blended learning strategy. This face-to-face learning could be a peer learning. With peer learning the number of student gathering will be reduced. The study of Neal (2020) on world youth skill day noted that TVET institutions face extra challenges beyond those affecting other education sectors, as it is difficult and sometimes impossible to develop practical skills online. Neal (2020) stressed that TVET programmes often require a blended approach with some time spent developing practical skills in workshops or industry settings. In line with this study, the study of Balogun, *et al.,* (2019) examined three modes of podcast augmented instruction and pre-service Physics teachers' achievement and retention, the result revealed that students taught Physics using Video Podcast Augmented Instruction and Audio Podcast Augmented Instruction achieved better than their counterpart taught using Enhanced Podcast Augmented Instruction or Classroom Lecture Only. This study corroborates with the study of Gambari, *et al.,* (2018) on the impact of virtual laboratory on the achievement of secondary school chemistry students in homogeneous and heterogeneous collaborative environments, the results showed that students in homogeneous ability group taught Chemistry using virtual laboratory instruction in collaborative setting performed better than their counterpart taught Chemistry in heterogeneous grouping composition. The major challenges with all the process are: the availability of the devices in our technical colleges, readiness of the technical educators to embrace digital teaching and learning, availability of power supply and ability of the students to afford data and internets.

Conclusion

Ineffectiveness of entrepreneurship in TVET is based on lack of qualified technical educators, lack of motivation, outdated curriculum and many more. It was revealed that the entrepreneurship in TVET can be effective in this era of COVID-19 pandemic by adopting e-learning methods of teaching and learning such as: Podcast and Vodcast, Video tape instruction, blended learning, Zoom/google meet lecture delivery, Web-based instruction and many more. Therefore, the study has determined the best way of enhancing teaching and learning of entrepreneurship in TVET especially during the era of COVID-19 pandemic which will include practical skill and maintain the physical distancing. Not only that, the methods should be capable of preparing students in TVET to face the future as strong as possible in case of any future pandemics.

Recommendations

1. The TVET curriculum developers should restructure courses to fit into the electronics technology that can be used to teach both theory and practical skills of entrepreneurial trainings.
2. The Government should make electronics devices available in every technical college.
3. There should be training and retraining of technical educator on distance learning in using the available electronics devices.

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SUB-THEME 5

FUNDING OF TVET IN COVID-19 PANDEMIC

EFFECTIVE FUNDING OF TVET: A POTENT TOOL FOR SUSTAINABLE DEVELOPMENT IN THE ERA OF COVID-19 IN NIGERIA

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Abstract: *Technical Vocational Education and Training (TVET) is a vital component of the economic development equation of any country. However this training system can only be effective where adequate funding of TVET is in place. Funding has been the bane of TVET in Nigeria. The Coronavirus disease - 2019 (COVID-19) which made many nations of the world to go into recession Nigeria inclusive has further complicated the issue of TVET funding. This notwithstanding, the focus on TVET with regard to skill acquisition cannot be compromised. This paper "Effective funding of TVET: A Potent tool for sustainable development in the era of Covid-19 in Nigeria, X-rays the concepts of TVET, funding, sustainable development and COVID-19. It further examined the present funding policy of TVET, funding of TVET for sustainable development in the era of COVID-19 in Nigeria. It concluded that funding of TVET should not be left alone for government and that other sources of funding TVET should be explored to improve on the lean funding. It recommended among others, that federal government should endeavour to make provision of 26 percent of its budgetary allocation for the education sector as recommended by UNESCO and that institutions should generate internally generated revenue (IGR) which should be used wisely by management to fund TVET.*

Keywords*: Funding,Technical Vocational Education & Training, Sustainable Development, COVID-19*

Introduction

The development of technical and vocational education and training (TVET) in various nations of the world has lent way to rapid change in technological advancement of the 21st century. The programme is so relevant that it is an integral part of national development. TVET is considered a powerful tool to prepare youth for the labour market and provide lifelong learning opportunities to adult (UNESCO, 2017). Thus, TVET is any form of education whose purposes are to prepare individuals for occupation or group of occupations. Funding is an important administrative intervention. Okoye and Arimonu (2016) defined TVET as the training of technically oriented personnel who are to be the initiators, facilitators and implementers of technological development of a nation. In the same vein, Okorafor and Okorafor (2017) described TVET as the type of education and training specially designed to meet the economic and social needs of young people who want to work and adults who want to acquire increased job competencies and thus raise performance standards at the work place. Similarly Famiwole (2021) viewed TVET as the type of education or training designed for preparing individuals to be self-reliant, earn a living or increase their earning in an occupation where technical information and understanding of the law of science and technology are applicable to modern design, production, distribution and services are essential for success. Accordingly, TVET has a cardinal part to contribute to the realization of 2030 sustainable development goals. It offers the individual opportunities for lifelong learning and enables both personal development, as well as civilized, developed and sustainable communities and economies. Mubanga, *et al.,* (2019) stated that TVET is education and training that accords learners the opportunity to acquire vital knowledge and skills needed for employment through formal, non-formal and informal training and learning modes, it is an accepted important conduit for delivering social parity, access, inclusion and sustainable development. It is conventional knowledge that education and training of any kind requires financial resources if specified learning outcomes are to be attained. On the one hand, TVET by its nature, structure and composition in terms of the occupational standards and curriculum, is somehow expensive compared to general education. Staffing, buildings, other critical infrastructure, machinery, tools, equipment, learning materials are important resources that should be financed and made available in TVET institutions of learning.

However, the implementation of TVET curriculum has not been viable in Nigeria since its inception because of poor funding of the programme (Joseph, *et al.,* 2018). According to Business Dictionary (2009) funding is the act of providing financial resources, in the form of money, or other values such as effort or time, to finance a need, programme and project usually by an organization or government. Similarly, the www.web.finance.inc.com (2017) defined funding as the ability to provide financial resources to finance a need, program or project. In the same vein, Amadi (2021) described funding as the act of providing funds for business activities, making purchases or investing. Therefore, funding is regarded as the act of providing money for the execution of a given project by an organization. TVET in Nigeria is suffering frustration and indignity of very low rating in the world ranking due to inadequate funding. To worsen the situation, with the outbreak of COVID-19 pandemic, the Nigerian government announced a total lockdown on all activities and for citizens to stay at home and practice social distancing to help stop the spread of COVID-19 virus. According to UNESCO (2020) an estimated 1.6 billion learners have been affected as a result of school closures in more than 190 countries and all continents. Obiakor and Adeniran (2020) further stated that almost 40million learners have been affected by the nationwide school closures in Nigeria. In other words, COVID-19 has disrupted the learning in Nigeria by limiting how students can access learning across the country that already has a fragile education system. COVID-19 pandemic poses unprecedented challenges on the government, students, parents and particularly on TVET student due to the fact that TVET is a practical oriented programme. A more worrisome scenario is that the COVID-19 pandemic, in which many countries across the global community are facing unprecedented challenges as a result of its effect, Nigeria and her citizens are no exception. As a result of this deadly pandemic many countries including Nigeria are investing in skills development in the era of COVID-19 as a priority responsibility due to the significant socio-economic benefit that can accrue to the individuals, business and the country as a whole. In most developing countries Nigeria inclusive TVET funding is usually from three key sources comprising government budget, school fees and the private sector. Additionally, there are other sources of funding consisting of employee contributions, private donations, internally generated income and external assistance.

In addition, COVID-19 crippled the economy of nations across the globe including Nigeria, this has made funding of TVET in the era of COVID-19 more difficult leading to the production of graduates from our TVET institutions who do not possess the employable skills needed for the world of work. TVET has become a theoretical studies rather than being practical oriented. A number of factors are indeed responsible for this ugly situation. Mubanga, *et al.,* (2019) pointed to the fact that the present funding of TVET was barely sufficient to sustain its operation. According to Ibeneme (2007), Nigeria does not seem to accord TVET the attention it deserves. In support, Odu (2011) argues that some of the challenges of TVET include inadequate funding, poor workshop organization and inadequate instructional materials. The views of these scholars are further corroborated in that the Nigeria government in previous budgets and even in that of the current year 2021 have not accorded the education sector the attention it deserves in terms of funding. The budgetary allocation of the Nigerian government to education has been on a steady decline. In the current 2021 budget, the education sector got only ₦1.09 trillion out of ₦13.6 trillion representing 8.6% of the national budget which is far below the international benchmark for education in developing countries of 26%. Given the state of affairs in the world today, the nation's ability to ensure continuation of learning will largely depend on their ability to swiftly harness available technology and provide adequate facilities that will ensure learning in TVET institutions. However, numerous challenges are encountered in developing a workable mechanism for TVET system to yield the desired developmental outcome due to inadequate parliamentary financial appropriations. It is therefore clear that for TVET to cope and align with global developmental trends, particularly in this era of COVID-19, and be in the position to scaffold the attainment of the sustainable development objectives, and ultimate aims, the financing aspect is a critical factor that requires greater consideration. This paper therefore appraised the effect of TVET funding as a potent tool for sustainable development in the era of COVID-19 in Nigeria.

Concept of sustainable development in the era of COVID-19

According to the Dictionary of Cancer Terms (2019) Coronavirus disease is a highly contagious respiratory disease caused by severe acute respiratory syndrome (SARS) Coronavirus 2 is thought to spread from person to person through droplets released when an infected person coughs, sneezes or talks. It may also spread by touching a surface with the virus on it and then touching one's mouth, nose or eyes but this is less common. World Health Organization (2019) described corona virus as a large family of viruses which may cause illness in animals or human. In humans several corona viruses are known to cause respiratory infection. On the same note, Nnana (2020) defined corona virus as a type of disease that does not discriminate based on age, gender or even race. In addition, Nweke, *et al.,* (2020) viewed Coronavirus disease COVID - 19 as an invisible enemy initially observed in the Wuhan province of China now spreading fastly around the world. The word 'sustainable' means a way of using any natural substance without harmful interference and exhaustion for a long time. Mojekwu and Uka (2017) defined development as both redistribution of wealth and meeting the basic needs of the masses at sustainable level. Essien (2004) viewed sustainable development as a term that has to do with meeting the needs of the present generation without denying future generation access to the same natural resources for their own needs. In addition, Adebola (2007) described sustainable development as a kind of development that can be initiated and managed properly in such a way as to give attention to continuity and presentation as people explore explicit available recourses for the enlargement of their existence. According to UNESCO (2012) the Brundtlan commission defined sustainable development as meeting the needs of the present generation without putting at risk the capacity of generations to come in meeting their own requirements. Therefore, TVET for sustainable development in the era of Covid-19 involves integrating key sustainable development issues into the teaching and learning of TVET. Adequate funding of TVET remains key to its sustainability.

State of TVET funding policy in Nigeria

The United Nations Education Scientific and cultural organization UNESCO has set a benchmark of 26 percent of national budget for the education sector. Nigeria over the years has not allocated up to 10% (Josephet al., 2018). They further stated that countries such as South Africa, Ghana, Uganda, Morocco among others have met up the standard. In 2021 for example, the Federal Government of Nigeria spent N1.09 trillion on education out of a budget of about N13.6 trillion which translates to 8.6 percent of the entire budget (Fatoba, 2021). Oseni (2012) asserted that sometimes wide gaps exist between the amount budgeted for and amount released. The World Bank rated Nigeria the least (20th position) in the annual budgetary allocation to education out of the selected countries in 2012 (Odiaka, 2012). Adequate funding is crucial for quality TVET provision. Funding policy and how such policy is unimplemented equally vary from country to country according to national economic priorities. Osidipe (2019) stated that the principal source of funding for TVET in most countries is government, with supplementary support from a range of organizations, bodies and individuals. Palmer (2018) maintained that the primary source of funds in many public TVET institutions in Nigeria significantly is government funding while student school fees constitute the major source of funds for privately own training providers and that inservice training costs in companies are principally borne by the respective companies. In Nigeria, the current funding of TVET is often barely sufficient to sustain it, let alone its development to ensure equitable access for all. Ikponmwosa and Attah (2021) stated that right now, funding of TVET remain a mirage because attention or priorities are not placed on skills development. They further maintained that this inadequate funding has worsened due to the economic recession brought in by the COVID-19 that has engulfed Nigeria as a nation. The lack of resources available for TVET raises the question of the nation's funding priorities when it comes to TVET, which is reflected in the proportion of education budget that is spent on skills development. The funding of TVET often represents a small share of the education budget compared to general education, and many statistics on the outcomes of training systems show that TVET students intergrate faster in the labour market.

Alternative TVET funding strategies for sustainable development

TVET is considered a powerful tool to prepare youths for the labour market and provide lifelong learning opportunities to adults. It plays a strategic role in the achievement of the 2030 agenda for sustainable development. Funding of TVET simply means the ways and means employed by government to satisfy the recurrent and capital expenditure requirement. Adegbenjo and Olubato (2015) stated that one obstacle to the development of TVET is the issue of resources for its sustenance. They further maintained that TVET is a practical-oriented activity and it entails the disbursement of large amount of financial resources for the purpose of ensuring that there are sufficient numbers of competent and appropriately skilled persons, to support economic and national growth. Adequate funding is crucial for quality TVET provision. Quality TVET is the bedrock of all social and economic development, and adequate funding is the foundation on which it relies.

The conceptualization of TVET cuts across education levels and sectors. The sustainability of TVET depends on the level of adequate funding available and this determines the level to which adequate qualified staff, teaching and learning materials will be provided. (Osidipe, 2019). Funding of TVET for sustainable development in the era of COVID-19 is very vital especially when other sectors of the economy is failing. The inadequate funding of TVET programmes in Nigeria particularly in this era of COVID-19 has led jobless youths into negative vices such as kidnapping, cyber crimes, arm robbery, violence etc. Funding strategy is a formidable instrument to support entry into the world of work in order to positively contribute towards resolving the myriad of financial challenges that are ravaging both public and private training providers in TVET. However, TVET providers normally have a different mixture of funding streams across the countries. The pertinent questions that may arise are: How can this anomaly be corrected? How can adequate funding of TVET for sustainable development in the era of COVID-19 be achieved? Scholars advocated adequate funding of TVET programmes since it is capital intensive (Akpan, 2010; Atsumbe, *et al.,* 2012, Ofiong, *et al.,*2013 and Ikponmwosa&Attah, 2021). This can only be achieved through adequate funding.

Adequate funding of TVET need to be emphasized in Nigeria particularly in the era of COVID-19 if Nigeria is to provide the required training and competencies to individuals that will proffer adequate solution to unemployment and technological backwardness. Iheme and Yalams (2018) stated that TVET is believed to be too expensive for any government to provide adequately for it. They further maintained that no government of today can afford to provide and finance all the skills needed by a modern economy. In this era of COVID-19 where many countries including Nigeria have gone into recession it will be difficult for government to fund TVET adequately. Therefore there is the need for additional alternative sources of funding. The following is the identified array of some sources of improving the lean funding of TVET for sustainable development in the era of COVID-19:

1. ***Private – Public Partnership (PPP):*** This involves TVET institutions and providers collaborating with companies and non-governmental organizations. Any institution that has successful private and public companies or firms within their area could make contacts with these firms for assistance as the need arises. In some areas we have the multi-nationals who are also expected to carry out their social responsibilities in the host communities where they are operating. The TVET institutions need to maintain a good relationship with the community, firms/companies, non-governmental organizations and other institutions around them for peaceful co-existence (Adegbenjo & Olubato, 2015). Offiong, *et al.,* (2013) also asserted that collaboration could be initiated by the heads of such institutions and that the result would be amazing if organizations like oil companies, communication service providers, financial institutions, the hospitality industry are contacted for this purpose.

2. ***Establishment of Project (Investment):*** The establishment of business ventures that will generate income is another avenue that could be explored to facilitate funding of TVET in this era of COVID-19. In this regard TVET institutions have a great role to play since virtually all the departments are practical-oriented. Such ventures include establishment of livestock farms, block moulding venture, restaurant venture, bakery, rental services, business centre, furniture making workshop, auto-mechanic workshop, metalwork workshop, electrical/electronic repair workshop etc: Also Home Economics Education Department should be marketed as caterers and event planners. These ventures could be carried out by engaging students under the close supervision of their teachers. Offiong, *et al.,* (2013) maintained that by this approach TVET institutions in Nigeria are likely to be revenue yielding to the favour of their continued and productive existence. In like manner, Omole (2012) asserted that all the institutions in Nigeria should generate Internal Generated Revenue (IGR) for their sustenance.
3. ***Alumni Associations:*** This is a body of every old student of the institution most of whom are well placed in the society, politics and some are captains of industry. All TVET institutions except the newly established ones have alumni associations. Therefore efforts should be made by the management of these TVET institutions to trace all alumni students who passed through these institutions. Media advertisements could be useful in locating successful alumni for the formation of alumni associations. This avenue could be employed to get these alumni members to donate and make meaningful contribution in cash and in kind to their alma mater from time to time with the aim of promoting TVET and its sustainability particularly in this era of COVID-19.
4. ***Renting out of Institutional Facilities:*** TVET institutions should embark on renting out some of their facilities with the payment of certain amount of money. Institutions in urban areas may be contacted by the community for the use of facilities like football fields, multipurpose halls, students' hostels or halls and other facilities that are useful to them. Buttressing this, Adegbenjo and Olubato (2015) stated that such facilities should not be free of charge, certain amount of money should be charged on such facilities and that will serve as part of IGR that will be used to fund TVET for sustainable development in the era of COVID-19.
5. ***Employers of Labour:*** Employers of labour should assist in financing training programmes that are designed to upgrade productivity within a particular industry or business. Industries and businesses that benefit from TVET should contribute to its cost. In order to ensure adequate funding of TVET programmes, organizations who are not ready to make financial contributions voluntarily should be compelled to do so. Smith and Billett (2005) suggested two policy options to increase employer's financial engagement: either by creating incentives to encourage voluntary involvement or by compelling employers through imposition of levies or licensing arrangements.
6. ***Endowment Fund*****:** To have access to quality TVET for sustainable development, funding of TVET should not be left alone to the government. This is money donated to provide income for the execution of some projects. TVET students can organize programmes like prize-giving day, inter-house sports competition, departmental week, football match competition and so on in order to raise fund. Appeals can be made by the TVET institutions to government agencies, non-governmental organizations (NGO), philanthropists, philanthropic foundations and wealthy individuals as well as organizations to donate funds generously toward the execution of some specific projects which will assist TVET to achieve its mission in Nigeria (Offiong, *et al.,*, 2013). As a means of spurring up interest on the part of donors, some specific structures, laboratories or farms could be named after such donors. Other additional sources of improving the lean funding of TVET include: Unions e.g. Nigeria Labour Congress and any affiliated unions. Students Unions and Departmental associations can also assist in the development of TVET. Establishment of Entrepreneurship Centres and carrying out of exhibition programmes will aid generation of income for the funding of TVET, thereby ensuring sustainability.

Conclusion

Access to a functional education for every child is the responsibility of the government because education is the source of empowerment that every individual needs to contribute to national and economic growth of a nation. TVET as a skill-based programme is capital intensive due to the infrastructure, equipment and resources needed to develop the right skills in the students in order to ensure technological growth of the nation. The increasing costs of establishing and running TVET in the era of COVID-19 due to high cost of materials and facilities require that urgent measures be taken to source for new areas of additional funding in order to ensure its sustainability. The call for effective funding of TVET for sustainable development in the era of COVID-19 becomes imperative because it has been observed that the government of Nigeria finds it difficult to release the meagre 26% recommended by UNESCO as budgetary allocation to education. It is also obvious that the government cannot fund education and TVET in particular. This is evident in the state of infrastructural facilities in our TVET institutions. If TVET, which is the potent tool for reducing the rate of unemployment is effectively funded - particularly in this era of COVID-19 where white color jobs are not readily available - the rate of kidnapping, stealing, maiming, incessant killing by Boko Haram and unknown gunmen will be reduced in this country. Therefore, effective funding of TVET for sustainable development in the era of COVID-19 is key to industrial apathy and technological backwardness in the country.

Recommendations

Based on the conclusion, the following recommendations were made:

1. The federal government should endeavour to make provision of 26 percent of its budgetary allocation for the education sector as recommended by UNESCO.
2. TVET institutions should shift from total dependence on government for funding and start to look inward and outwards in funding TVET.
3. The industries and companies should not wait until they are compelled to finance TVET, they should endeavour to render assistance voluntarily in order to enhance national growth.
4. Institutions should strive to increase their Internally Generated Revenue (IGR) which should be wisely used by the management of TVET.
5. TVET institutions should develop very cordial relationship with their host communities in order to make it easy for them to approach them for assistance.
6. Annual TVET exhibition competitions should be organized by TVET institutions to generate funds.
7. Establishment of endowment fund, entrepreneurship centres and businesses by TVET institutions should be encouraged, as this will help them generate income.
8. The Alumni Association should also help to provide additional funding of TVET in cash and in kind.

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FUNDING OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN THE ERA OF COVID-19 PANDEMIC IN NIGERIA: ISSUES AND STRATEGIES

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Abstract: *COVID-19 is a global pandemic that imposes educational system into deplorable condition which necessitated the need for more funding in educational institutions so as to meet up with increasingly demand in education. In Nigeria, The paper discussed issues of funding and explored strategies for its revitalizing in respect of Technical Vocational Education and Training (TVET). Strategis options explored included; the need for multilateral agencies and bilateral donours concerned with TVET toestablish mutual collaboration to provide more global funds; international communities to establish TVET innovation funds; outcomes-based accountability mechanism needed to serve as heck on institution funding systems in TVET in Nigeria. The paper recommended, among others, that adequate financial resources should be allocated to technical and vocational education in Nigeria; TVET private sector partnership should be encouraged, so as to ensure effective and sustainable development of TVET programmes and there is the need for TVET institutions to establish good relationship and linkages with similar institutions abroad as this will promote cross – fertilization of ideas and enhance technology transfer. By way of conclusion, Government plays a critical role in the success or failure of TVET programmes in Nigeria. Hence the need to invest more money in TVET. As policy makers it must ensure that TVET programmes have adequate funding and support.*

Keywords: *Technical Vocational Education and Training, Funding Education, COVID-19 Pandemic*

Introduction

Technical Vocational Education and Training (TVET) is the type of education that lay emphasis on the application of skills, knowledge and attitude needed for employment in a given occupation in any field of social and economic development. TVET is recognized as the wide-diversified educational instrument for economic growth of a country by a way of manpower production relevant to the needs of industry, society and changing technological work environment. In the same vein, the United Nations Educational, Scientific and Cultural Organization-UNESCO (2014) described TVET as a form of education which is designed mainly to provide learners with the practical skills, know-how, and understanding necessary for direct entry into a particular occupation or trade (or class of occupations or trades). TVET has been a tool for empowering people, especially the youth, for sustainable livelihood and social- economic development. The development of technical and vocational skills is vital to economic growth for enterprise productivity, profitability, as well as for national productivity and wealth creation. Technological innovation and economic growth fuel the demand for skilled workers. These technical and vocational skills are vital for industrial growth and individual prosperity. The skills obtained enable the individual to increase productivity and income (Fagge, 201). TVET is very important for developing and sustaining the people. It is expected that educated people are more able to endure, acquire experience, wisdom and the capability to fend for themselves and for building the nation. TVET is both an instrument of stability and of change. Nigerian Educational Research and Development Council-NERDC (2014) highlighted the following as the overriding goals of TVET in Nigeria:

1. Provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical levels
2. Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development
3. Provide training and impart necessary skills to individual who shall be self-reliant economically

TVET is delivered at different levels and in different types of institutions such as; Technical and Vocational colleges, Polytechnics, Colleges of Education, and Enterprise centres. In a bid to strengthen TVET programmes as part of the human resource development and to meet present and future needs for rapid socio-economic development of Nigeria, the Federal Government through the National Board for Technical Education in 2000 and 2007 signed an *Aide Memoire* with UNESCO for the development of new curricula, e-books and training manual for use in Polytechnics, Monotechnics and other specialized institutions (National Board for Technical Education- NBTE, 2013). Alam (2015) reported that the world is depicting an environment of competency in rapid advancement of technology which demands high degree of skills. These were fully recognized by countries and were quick to engage in formulation of strategies for TVET reforms. According to Enahoro (2008), TVET is utilitarianism and it is a concept of reorganizing the importance of labour. Nigeria needs to reshape the crumbling socio-economic status and directed its education towards making it occupational type and equipped its recipients to face the challenges of the world of work.

Despite all the glaring contributions of TVET to national development, Nigeria is yet to accord this type of education the attention it deserves. This is one of the major reasons for the rising unemployment, poverty and unabated crimes in the society today. Reko and Maxwell (2016) observed that the good intentions of successive Nigerian governments about TVET programmes are still fraught with a lot of challenges which include; inadequate funding of technical and vocational education training programmes. Reko and Maxwell further lamented that, inadequate funding of vocational institutions has caused the turning out of half-baked graduates because there is no fund to build and maintain workshops, laboratories or even purchase modern equipment. Staffing of vocational and technical education is generally inadequate because of poor funding. Also inadequate funding of vocational technical institutions has often caused a lot of difficulties in the payment of staff salaries. Furthermore, Momoh (2012) observed that lack of commitment to technical education and inadequate funding on the side of the government has weakened technical education in Nigeria and the direct consequence of this will be dwindling of vocational technical education institutions.

Issues and strategies for revitalizing TVET funding in Nigeria

1. The main issue lies in the fact that for TVET system to become a success, it needs to have government support in the way of a continual funding stream. Lack of adequate and uninterrupted funding of TVET are provisionally managed through the following means:

   (a) Many TVET programmes are funded by outside entities. These entities may include USAID, World Bank, or the UN. Though these organizations provide needed funding for TVET, the funds are typically not available over a long span of time (Suriana, 2012).

   (b) Revamping funds in technical vocational education and training through public-private partnership (PPP) for skill development. The alliance between TVET and public/private sector is referred to as partnership. PPP is an agreement where parties or partners agree to cooperate to advance their mutual interests. This agreement could be reached between government, schools, employers, professional associations, employees and their representatives, the local community and combinations of organizations on how to source funds for the development of TVET. TVET institutions can partner with public/private sectors to extend their frontiers for sustainable development of TVET (Jane, 2018).

   (c) Multilateral agencies and bilateral donors concerned with TVET should explore mutual collaboration on a joint program to provide more global funds in TVET.

   (d) International communities should establish TVET innovation funds to promote development of TVET programmes.

   (e) An outcomes-based accountability mechanism needs to be developed for donors providing aid for TVET which serve as a check on institution funding system.

2. Dopemu and Adeyefa (2019) highlighted the following as the strategies for enhancing funding of TVET in Nigeria:
   (a) The government should enhance more on the funding of vocational-technical education to meet the staffing, facilities and equipment of the sector to meet the global standard.
   (b) The institutions of vocational and technical education programmes should develop a good relationship with the host community to make it easy for them to approach them for assistance and for the community to be able to patronize their products from time to time.
   (c) International aids should be sourced by TVET institutions in Nigeria in order to boost the implementation of action plans.
   (d) Financial assistance for TVET should be sourced via companies, philanthropists or the Institutions Alumni Associations.
   (e) TVET institutions should be practically oriented to provide goods and services to various sectors which will, in turn, bring in reasonable funds to the institution from time to time.

3. French Development Agency (2014) reveals the following as key recommendations for financing TVET for sustainable development;
   (a) All financial support should consider the funds as a place for private sector investment in for the development of the TVET.
   (b) All financial support should help the funds play a structural role in TVET and apprenticeship mechanisms.
   (c) All financial support should clearly help the funds to better target their missions on the strategic occupations and TVET policies.
   (d) All financial support should encourage the funds to finance informal sector enterprises and professional organizations in TVET.
   (e) All financial support should strengthen the equity dimension of the funds without diverting them and strictly be used for TVET.
   (f) All financial support should participate in the stabilization and sustainability of the funds' resources for TVET.
   (g) All financial support should be an opportunity to strengthen, or establish, the dynamics of autonomous and partnership-based management of TVET.
   (h) All financial support should help in structuring effective and sustainable training and qualification mechanisms in TVET.
   (i) Any financial contribution presupposes the implementation of a tool for the effective implementation of TVET should be implemented.
   (j) Financial support to TVET should require the obligatory optimization of its interventions based on the best lessons learned from the other funds.
   (k) An improvement in the functioning of TVET fund can only be achieved through the creation of effective tools common.
   (l) Donor supporters should help funds become judicially used in TVET

Conclusion

Technical Vocational Education and Training (TVET) is globally recognized for its role in preparing people for dynamic engagement in occupations of functional value and effective source of skilled workforce. Government plays a critical role in the success or failure of TVET programmes in Nigeria. Hence the need to invest more money in TVET such that adequate and uninterrupted funding of TVET is attained at different levels of education. As policy makers it must ensure that TVET programmes have adequate funding and support. Therefore, government policy makers must ensure that TVET programmes has adequate funding and support.

Recommendations

1. Adequate financial resources should be allocated to technical and vocational education in Nigeria.
2. TVET private sector partnership should be encouraged, so as to ensure effective and sustainable development of TVET programmes.
3. There is the need for TVET institutions to establish good relationship and linkages with similar institutions abroad as this will promote cross – fertilization of ideas and enhance technology transfer.

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FUNDING CONSTRAINTS OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING AGAINST EFFECTIVE UTILISATION OF INNOVATIVE DIGITAL LEARNING PLATFORMS DURING THE COVID-19 PENDEMIC

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Abstract: *COVID-19 pandemic has serious impact on TVET considering the global financial commitment to practical based learning of Vocational Education and Training as targeted in the objective of TVET due to worldwide lockdown. This study investigated the funding constraints that impede students' training using innovative technological software like virtual reality and augmented reality during the COVID-19 Pandemic. The COVID-19 crisis is leading to reductions in work-based learning opportunities for vocational education and training (VET) students. Some developed countries such as Germany and Australia have put in place financial incentives to encourage firms to provide work-based learning opportunities to students during the COVID-19 crisis: This policy brief argues that VET programmes can be adapted to deliver practical components of VET in school-based settings when there is a persistent shortage of work-based learning opportunities. It also describes how innovative technologies such as virtual reality (VR), augmented reality (AR) and simulators can be utilised to facilitate school-based delivery of practical learning, but also to improve the effectiveness of face-to-face and online teaching in VET in the longer-term.*

Keywords*: COVID-19 Pandemic, Funding TVET, Virtual Reality, Augmented Reality*

Introduction

Covid-19 refers to an infectious disease caused by a virus also known as corona virus. Corona virus was not common in the world till December, 2019, when its first appearance was observed in Wuhan, China. Covid-19 is an infectious disease because it can be transferred from a positive carrier of the virus to another who does not have the disease but in close proximity to the affected person. This deadly disease was declared a global pandemic by World Health Organization (WHO) on March 11, 2020, after claiming several lives globally. The severity of covid-19 is more on the economies of most developing nations around the world including Nigeria. Corona virus whose history is traceable to China was first noticed in Nigeria in March, 2020. The disease posed a serious health risk to all Nigerians particularly, the elderly as many of them died from it due to poor immunity. The corona virus attack has a significant impact on the education system and structure as a lack of operational activities, and closure of educational institutions has affected the progress. As per the views of Van Lancker and Parolin, (2020), the parents and national governments are keen to protect the people and working on the plan to manage the operations. The virus is attacking people, who are suffering from serious disease like blood pressure, diabetes, cancer, tuberculosis. COVID-19 is attacking the respiratory system of people who are having a weak immune system. Since the beginning of the pandemic, it has become increasingly clear that many states will be hard-pressed to continue providing essential public services, including primary and secondary education, unless they receive signifi cant amounts of federal aid. Only the federal government has the ability to tax or borrow on the scale required to cover the states' ongoing expenses in education, health care, and other sectors (Childern Now, 2020). In addition to this, many parents will avoid sending their children abroad for higher education due to the high risk of virus attack in the coming years. According to Ho, *et al.,* (2020), the sudden shift to online learning will be difficult for the developing and underdeveloped countries and educational authorities due to lack of infrastructure and planning for the format that suits the new approach. The teachers and students are not familiar with the equipment and process of online learning due to lack of technical understanding. The universities and colleges can shift towards the model of blended learning and offer education through online tools which will be cost and time effective for both teachers and students. However, teachers have to take training for understanding the technical approach and become technology savvy.

The Covid-19 pandemic and the resulting government actions to lock down large parts of society have led to the wide-spread closure of education premises for long periods. UNESCO estimate that 205 countries have fully or partially closed school, college and university premises for an average of 27 weeks between March 2020 and March 2021 (UNESCO 2020a). Whilst education systems have moved learning online in most instances, this has not fully mitigated against lost learning (OECD 2020a) and may have further entrenched students already disadvantaged in their education compared to their peers both within and between countries (OECD 2019). The full closure of educational premises in 2020 tended to be longer in countries with the lowest educational performance and this combined with the need for infrastructure, equipment and technical knowledge to deliver effectively online, is likely to have accelerated the social inequality in learning opportunities (OECD, 2020b). Transparency of education expenditures at all levels aligned with administrative data . The analysis of TVET financing in the region is extremely hampered by the dearth of statistical information on its extent and its relative importance vis-a-viz other education spending. This lack of information limits the ability to formulate and evaluate TVET financing policies (especially by civil society). Additionally, without information linking spending with outcomes and results it is not possible to analyse with the necessary rigour the efficiency and effectiveness of TVET investments. There is no doubt that Covid-19 was a financial burden, and perhaps particularly so for private institutions. As noted in Section 2 of UNESCO (2020b) report, Covid-19 financial support was available in some countries but not in others. The pandemic impacted student intake numbers at institutions in Ghana, India and Malaysia yet fixed costs such as payroll still had to be managed whilst teaching continued. To maintain the financial stability of the organisation, research participants described how rent negotiations took place with campus landlords and staff went down to half pay or were only paid when working. These may have been temporary measures simply to offset the additional costs of the pandemic.

Technical Vocational Education and Training (TVET) programs are well-placed to play an important role in the COVID-19 pandemic. They have significant potential to contribute in three stages: the current "coping" phase, an intermediate phase when schools and businesses gradually reopen, and during the recovery period when structural changes are expected in both the education system and in the labour market. The model of pandemic handling varies from country to country and during the pandemic, some countries have provided coronavirus financial stimulus and support packages for education whereas in others, budget spending has been prioritised on healthcare and tackling the pandemic. The 2030 Agenda for Sustainable Development offers countries in the region the opportunity to substantially remake their development policies, in line with the Sustainable Development Goals. New public policies are needed not only to address existing socio-economic gaps, but to place countries on a sustainable and inclusive growth trajectory. In this context, a key pre-requisite for achieving these goals is accessible and inclusive quality education (SDG 4). Research has shown that investments in human capital —by the public sector, by firms and by households— have a significant impact on economic performance as well as individual and social wellbeing. The role of TVET in this process is key, especially as the global and regional economy undergoes significant changes. The world of work is evolving rapidly, as productive structures adapt to the shifts induced by the emergence of new technologies and new business models. Skills in this environment tend to depreciate quickly and therefore must be continually updated. In this sense, TVET provides opportunities to transition students into this new world of work as well as keeping existing workers employed. TVET targeted to women, youth, senior citizens and other vulnerable populations also provides governments with significant leverage to reduce inequality and poverty. To realize these benefits, however, will require a substantial commitment by governments, households and firms to finance TVET. Unfortunately, this task is made more difficult by the exceptionally high level of fragmentation that characterizes TVET, both inside and outside the formal education system. This situation argues for the State to play a key role in providing the necessary governance of the market as well as in mobilizing the financing necessary to overcome these market failures.

The use of advanced technologies in education is on the rise

As simulators, Virtual Reality (VR) and Augmented Reality (AR) become more affordable and teachers develop the skills to effectively use them in the classroom, their use could become widespread in education and training systems in the near future (Wentworth, 2018). Estimates suggest that between 2019 and 2025, the global investment in education technologies (EdTech) will grow on average by 16.3% each year, multiplying by 2.5 in a 6-year period (HolonIQ, 2020). A lot of the recent growth in EdTech was driven by investment in online learning tools and platforms, but investment in advanced technologies in the education industry, such as VR and AR, is likely to expand strongly in the coming years, with projections showing that this market is expected to grow sevenfold between 2018 and 2025 (HolonIQ, 2019). The COVID-19 crisis could further stimulate the adoption of these technologies by TVET providers in light of the need to provide alternatives and complements to work-based learning. VR, AR and simulators are already being implemented in learning environments, including in TVET:

According to a recent survey by the World Economic Forum, around 5% of teachers in schools in the United States and China, and 10% of teachers in the United Kingdom make use of simulation or VR applications in their teaching (World Economic Forum, 2016). A recent survey in the United Kingdom showed that 79% of Further Education institutions are already using VR or AR, but that more than half of them only use these technologies in one or two of their departments/faculties. Only a quarter of Further Education institutions using VR or AR use them in more than five departments (JISC, 2019). Still the use of these technologies is found to be more widespread in Further Education institutions than in higher education. In the Further Education sector VR and AR solutions are used in subjects such as construction, computer science, engineering, sports and nutrition, arts, media studies, health and social care, and the hospitality sector. Denmark has established Knowledge Centres to foster the use of advanced technologies in TVET teaching. For example, the knowledge centre for welfare technology Western Denmark promotes the use of advanced digital technologies in TVET schools by making teaching courses that incorporate VR available for different vocational subjects (Videnscenter for Velfærdsteknologi, 2020). These courses include both theoretical and practical elements to support teaching and learning. One of the tools that they have been promoting is the use of VR for training in pedagogical assistant study programmes.

End users' appraisals on the new technologies

As part of an ad-hoc survey carried out by this Knowledge Centre among 169 students from social and healthcare prorammes, two-thirds of students declared that VR is a good supplement to regular teaching and 43% of students even found learning outcomes to be better than in regular classes (Videnscenter for Velfærdsteknologi, 2020) Various specialised companies have been working closely with education and training providers to develop and adopt new technologies in the classroom. Technology solutions have been developed for a range of fields of studies, including typical VET fields. For example, software developer EON, has set up VR and AR solutions with applications to train students and employees in several industries, including applications for occupations in agribusiness, welding, plumbing, woodworking and metalworking among others (EON, 2020). More specifically, EON has produced AR applications to train logistics employees in airline companies, and VR applications to train oil refinery operators in safety procedures. EON has established collaborations and produced VR applications for dozens of tertiary education institutions. Other specialised companies such as Electude and Labster Labs provide training to TVET students making use of VR and simulators for the fields of automotive mechanics and medical sciences respectively. Even though these technologies may not be able to replace real life experience completely, especially since they do not facilitate the development of the soft skills that often come with workplace exposure; they are a valuable option for those students looking to develop occupational skills both in online and face-to- face TVET programmes.

SWOT analysis on the useability of the new technologies

The benefits of the use of innovative technologies go beyond the current COVID-19 crisis as they offer long-term advantages in terms of flexibility, scalability and affordability. These technologies have the potential to make TVET systems more effective and resilient also in the longer-term. Given their unique characteristics, simulators, VR and AR offer several advantages when compared to traditional TVET. Often TVET students cannot access the latest equipment, and this is especially the case in school-based TVET systems. VR solutions can be updated regularly following the latest developments in industry, reducing costs related to investment in expensive equipment. Moreover, in certain cases spare parts or components are too expensive or unsafe, so in practice students cannot use them unless under supervision.

In this regards, VR and simulators could also reduce wasteful expenditures in those occupations that make intensive use of materials or supplies, representing a greener and cost-effective alternative. Moreover, the use of VR and AR also has numerous benefits for employers providing training, as these technologies can shorten the amount of time that new trainees need to spend on real equipment, which reduces the cost of training and therefore provides a cost-effective complement to traditional work-based learning. Moreover, the use of digital technologies is associated with increased student motivation and engagement, leading to higher student retention rates in TVET programmes and therefore contributing to equity in education (Khan, *et al.,* 2017; Aarkrog, *et al.,* 2018). Importantly, the use of new technologies can facilitate access to high-quality TVET for socially disadvantaged students, and therefore forster social inclusion and inclusive growth. The economy of scale associated to VR, AR and simulators imply that these technologies can be used in a large number of TVET schools and in different fields of study, which reduces the need for schools to invest in expensive equipment –which could be particularly challenging in schools in disadvantaged areas.

Prospects for the development of TVET learning resources

Software development could be fostered through public-private partnerships, and by building VET school associations and industry networks to share the costs. The role of industry experts remains crucial, as they could provide key insights during the software design and development process. Through their involvement, employers could also learn about the benefits of these technologies for industry as a tool for on-site training of current and new employees. One of the key challenges constraining the widespread use of innovative technologies in the education sector is their high development cost. The financial risk may discourage software developers to resume production until global demand increases. Purchasing simulators, VR or AR solutions involves an important investment for VET institutions. For instance, the software developer EON offers AR/VR solutions from USD 1 500 to up to USD 150 000, depending on their complexity (EON, 2020). Specialised equipment (VR headsets and hand sensors) can be as costly as USD 400 per kit (OCULUS, 2020). Nonetheless, as previously mentioned, these technologies can also generate cost-savings, as they are easier and less costly to update than physical equipment. Moreover, their cost could be shared by several institutions, as the same software can be used by different VET providers. In order to accelerate the introduction of these technologies, governments should consider providing financial incentives to third parties to produce applications for different industries and occupations. Some countries have already started doing so:

1. In the United States, software developers in education technology (EdTech) are being encouraged to collaborate with VET schools and the private sector to develop applications for school education (US Department of Education, 2015). The United States Department for Education established the Small Business Innovation Research (2020) programme to enable small businesses to have access to funding so they can explore their potential and commercialise their technological solutions. The programme provides grants of up to USD 1.7 million to develop and evaluate commercially viable education technology products to improve student learning and teacher instruction.

2. In the United Kingdom, the government has committed an investment of GBP 33 million (USD 38 million) from the Industrial Strategy Challenge Fund to support pioneering immersive technologies like VR and AR (HM Government, 2017). The United Kingdom has set out a strategy to provide guidance and support to education providers and the technology industry to help boost the use of new technologies in education that can positively impact educational outcomes (UK Department for Education, 2019). As part of this process the government expects to support the development of the EdTech business sector in the United Kingdom, so it can deliver high-quality products that meet the needs of educators.
3. China launched the Zhongguancun VR industrial park. This initiative promotes the application of VR in a range of sectors, including the education sector. Companies developing technological innovations that boost the development of the VR industry receive government subsidies for up to CNY 10 million (USD 1.45 million). By April 2017, more than 40 companies had been introduced to the park, engaged in the fields of VR hardware research and development (R&D), content creation, software development and industrial applications (China Daily, 2017).

Conclusion

As previous economic recessions have shown, a reduction in economic activity not only affects regular jobs but also TVET programme, mostly due to colleges trying to cut costs (Brunello, 2009). This crisis might bring about reduction in the offer of work-based learning opportunities, including, given the uncertainty regarding possible subsequent global waves of the COVID 19 pandemic and ensuing lockdowns, but also in light of the difficulty of organising training in technical colleges that are faced with strict health and safety regulations. New technologies, such as simulators, augmented reality (AR) and virtual reality (VR) can support the provision of practical training. Given their advantages in terms of scalability, flexibility and safety, these technologies also have the potential to improve VET systems beyond the current crisis.

Reccommendations

Effective adoption and use of innovative technologies in VET can be supported by:

1. Actively promoting and facilitating the use of simulators, VR and AR in VET, for example by providing financial support to schools so they can invest in these technologies.
2. Providing incentives to software developers to produce applications for different industries and occupations, ideally in close collaboration with industry experts and social partners to ensure that these digital resources are relevant.
3. Ensuring that VET teachers have access to relevant training to develop digital skills so they can effectively teach in digital environments making use of VR, AR or simulators.

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SUB-THEME 6

SCIENCE TECHNOLOGY AND COVID-19 PANDEMIC

COVID-19 PANDEMIC: A CHALLENGE TO TEACHING OF AGRICULTURAL SCIENCE AND TECHNOLOGY EDUCATION ACROSS THE HIGHER EDUCATION INSTITUTIONS IN NIGERIA

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Abstract: *This paper examined the effect of Coronavirus (COVID-19) on teaching Agricultural technology in tertiary institutions in Nigeria by utilizing secondary data. Coronavirus (COVID-19) is a virus that transmitted through respiratory droplets with mild, non-specific symptoms, such as fever, cough; shortness of breath, muscle pain and tiredness. More serious cases can develop serious pneumonia and severe respiratory anguish disorder with high mortality rate. The analysis indicated that COVID-19 has adverse effects on inculcation of Agricultural Technology educational of the country. Amongst such effects include disruption in academic calendar, poor schools system and closure of research and development centers in the country. All these potent great danger to educational development and possibly in future. Given these adverse effects, the researcher suggested that government should increase educational funding in the next budget especially towards tertiary institutions that teaches Agricultural Technology in the country in order to boost Agricultural productivity and managerial capacities of educational system of the nation that can influence international partners to promptly institute or scale up Coronavirus related educational activities among families and communities all over the nation.*

Keywords: *COVID-19 Pndemic, Teaching Agro-Technology Education, Higher Educational Institutions*

Introduction

Coronavirus disease is a transferable disease brought about by a recently identified virus. This virus is a pandemic disease, brought about by the serious intense respiratory condition. COVID-19 can be contacted through different respiratory tracts, for example, the mouth and the nostrils, and attacks the human respiratory organs (Danso, 2020). The flare-up of the virus was first found in Wuhan, Hubei, China, in December 2019 (The main affirmed passing was on 9th January 2020 in Wuhan), and was pronounced as a pandemic by the World Health Organization on 11th March 2020. WHO delineated nations to take prompt activities and scale up reactions to treat, distinguish, and lessen transmission to spare human lives as of May 20, 2020, over 4,900,000 cases of COVID-19 have been found in more than 200 nations and territories, with about 325,125 deaths and more than 1,900,000 recoveries (Worldometer, 2020). Before the outburst of the worldwide Coronavirus pandemic, the world was at that point managing a learning crisis, as confirmed by high quantities of Poverty. With the spread of the Coronavirus, the educational system was confronted with another crisis, as over 160 nations (as of March 24) has mandated schools to be closed, affecting at least 1.5 billion pupils and students in various tertiary institutions across the world. 194 institutions was shut down that caused not only loss of learning temporarily but also further misfortune in human capital and decreased economic opportunities over the long term. In addition to lockdown of institutions, countries are exploring options for remote learning and the use of other educational resources to mitigate the loss of learning. This involved capitalization on work already started and addressing ever-present challenges like degrees of accessibility within communities to ensure equity in accessing quality education. The life-threatening nature and rapid transmission of this disease have been felt globally as it significantly affects global education systems, especially in African countries typically Nigeria. Numerous African Higher Educational Institutions (HEIs) and other educational institutions have been ordered to close in order to manage the spread of the virus. UNESCO estimated that 776.7 million students were being obstructed worldwide by the closure of schools resulting from the COVID-19 pandemic. As of March 28, 2020, the COVID-19 pandemic affected more than 1.6 billion youths that were out of schools in 161 nations, including Nigeria. In developing and less developed countries, the circumstance is extremely blended and on the off chance that they cant act suitably.

Practically all the States in Nigeria were threatened because of the expedient spread of this lethal Coronavirus. To forestall and annihilate the murkiness brought about by the COVID-19, the manifestation of the extraordinary worry towards students, lecturers (teachers), and different partners, numerous circulars, broadcast, and letters were given by the pertinent stakeholders such as the Nigeria Center for Disease Control (NCDC), Federal Ministry of Health, Federal Ministry of Environment, Federal Ministry of Information, etc. However, the lockdown time frame has caused some extreme issues, for example, irregular lectures, postponement of exams, postponement of students' projects and other educational activities, which altered the academic year calendar (Gupta & Goplani, 2020). This is nearly 80% of the world's enlisted students. The COVID-19 pandemic is a health and human challenges (crisis) threatening different facets of life particularly educational system of the country. Hundreds of millions of students and lectuers alike suffered from the collapse of educational sessions and inculcation of knowledge within the system. Imminent collapse of entire educational system of the nation which can lead to political instability and increase and rising of banditry and social crisis has been identified by various experts in educational sector, unless immediate action is taken by both local, state and the federal government. In the longer term, the combined effects of COVID-19 itself, as well as corresponding mitigation measures and the emerging global recession could, without large-scale coordinated action, disrupt the functioning of educational systems of the entire country and the Africa in general. Such disruption can result in consequences for losing jobs, youth unemployment crisis, hunger, diseases and high mortality rate for more than half a century.

The pandemic hits the country at a time of immense global challenges. The country need to tackle all the institutional crisis in teaching Agricultural technology education in our various tertiary institutions across the country especially laboratory work, farm practical experience so as to ensure national food security is achieved. Addressing the COVID-19 crisis requires to work together across sectors and borders both to mitigate the immediate impacts and to reshape the educational systems ensure smooth running of educational programs across tertiary institutions that establish healthy competition among both private and public institutions so as to ensure sustainable educational development in the country. Trained human resources in a wide range of topics, aligned to the Science. Agenda for African Agriculture, are central to stimulating science-based technology innovation. Universities, Colleges of Educations, Polytechnics must lead the way in the effort to build Science, Technology and Innovation (STI) capacity of the next generation of the African workforce. Agricultural Science Technology and Innovation (STI) is critical for responding to the challenges of African agriculture and to elevate its performance and contribution towards economic development and poverty alleviation of a nation. Research has shown that the returns to investment in higher education are around 20%, and in Africa closer to 30% (Borland et al, 2000). Montenegro and Patrinos, (2013) opined that these are higher returns to investments than in both secondary and primary education.

Impact of COVID-19 on agricultural technology education in Nigeria

Going to school is the best public policy tool available to develop skills and potentials, the primary point of being in school is that it increases student's ability to become a useful and acceptable member of the society (entrepreneur). Even a relatively short time in school has a life-long impact in the life of students; a short period of school break may result in high consequences for skill growth in future. Hence, it is difficult to estimate how much the COVID-19 interruption affected learning of Agrotechnology which is vital to economic growth of the nation; it is only the visible effects that can be seen, the gradual decay of inbuilt abilities may not be easily noticed very precisely. We are now in a new world far different from the things we knew. The school time tables and schedules have changed as a result of the pandemic. Therefore, resumption of schools after the lockdown, so many grounds needs to be covered in order for the educational system of Nigeria to be able to compete with the world's educational system. Facilities in most tertiary schools are been underutilized during lockdown, some might have damaged as a result of not been used for a long period of time. In detail account of UNESCO, that there is no assurance that all the

learners who left the school were back to school after the pandemic lockdown; some may have change their lives' view seeing going to school as a waste of time, some may have died, some may have join bad groups shifting their attention away from school. Etc. this is where the work of parents and guidance should come in to ensure the proper welfare of learners even while they stayed back home. Unfortunately, learning within the homes are as well limited looking at the literacy level of some parents in Nigeria; not every parent could handle well the pedagogy aspect of parenthood and besides other commitments of parents are to be considered. The effect of this may not be easily noticed now; the future of students is naturally exposed to a serious academic crash if there are no proper interventions.

There is no doubt that students in terminal classes in lower and higher levels of education system of Nigeria has been held on a spot; they were unable to graduate or even move to the next level in their academic pursuit this has led to the great set back of the smooth running of educational sector of Nigeria and the world at large. What makes education beautiful and fulfilling is the progress in terms of moving to the next level, graduating and becoming a useful and acceptable member of the society after being exposed to the teaching-learning processes in the school. The careers of this year's university graduates may be severely affected by the COVID-19 pandemic. They have experienced majorly teaching interruptions in the final part of their studies, interruptions in their assessments, and finally they are likely to graduate at the beginning of a major global recession in the economy of the world at large at the end of the pandemic lockdown. While there was boom in the economy of Nigeria in the past, some graduates still find it difficult to get their desired jobs in the labor market, now that there is every tendencies that the economy of the country experienced a drastic meltdown after the COVID-19 pandemic, graduates may finds it difficult to secure menial jobs talk less of their desired jobs. Unfortunately if this persists for a longer period of time, there might be a great hit on the smooth running of the economy, educational system and other sectors of the country's economy at large. Here, poor market conditions at labour market entry cause workers to accept lower paid jobs for survival first, and that this has permanent effects on the careers of some graduates.

However, Effect on Education in Nigeria World Health Organization (WHO) in 2020, asserted that most governments globally closed educational institutions temporarily in an attempt to contain the spread of the COVID-19 Pandemic which Nigeria is not an exception and these closures are impacting almost 70% of the global student population as at first week of May, 2020. Similarly, in Nigeria the outbreak of COVID-19 affected educational sector by distorting learning process as a result of closure of both private and public institutions of learning by federal government through National Centre for Disease Control (NCDC). The closure of schools affects the research and development centers in the country and this potent great danger in researching into the cure of the COVID-19 virus. The Nigeria Education in Emergencies Working Group (EiEWG, 2020) reported that, "not only the closure of schools affected over 46 million students throughout the country, 4.2 million students in Borno, Adamawa and Yobe States, the most vulnerable groups of children targeted by the education partners". About 400,000 internally displaced person (IDP) children in same North-East attending some form of learning in the camps and host communities are affected by the lockdown.

Effects of COVID-19 on private tertiary institutions in Nigeria

Presence of private institutions of learning is one of the key feature of education sector in African countries and Nigeria in particular. The number of these private institutions is already considerably great and private student enrolment has steadily increased over the years. These private institutions usually operate along a commerce model of which the students' fees is the determinant to cover staff wages and salaries as well as operational costs. While public institutions may eventually receive assistance from the government to overcome the consequences of COVID-19, the private ones may be forced to stop their operations for lack of funds. Thus, if some of these institutions are shutdown as a result of lack of funds, it would have a negative impact on the higher institutions of learning and countries' economic development.

Conclusion

This paper examined the effects of COVID-19 virus on tertiary education in Nigeria by utilizing secondary data that was collected. Tertiary Agricultural Technology Education is offered in some of the nation's universities, polytechnics and colleges of educations. National higher education needs to be transformed so that it produces the graduates and researches that increases the use of Agricultural science technology and innovation for economic growth and development and to ensure sustainable national food security. The paper found that COVID-19 has adverse effects on tertiary education institutions. Such effects include; poor administrative schools system and closure of national research and development center's which potent great danger to the educational system of the nation. Given these adverse effects, the paper suggested that government should increase funding in the next budget in order to boost educational sector and international partners should promptly institute or scale up Coronavirus related education activities and programs in families and communities all over the nation.

Recommended solution to the effects of COVID-19 Pandemic on Nigeria education

Reasonably, at present the whole world is prioritizing the health sector to minimize contagion and limit deaths. They are also trying to assist the socially-disadvantaged of the population. Financial recuperation and support to different parts of the economy should come later. However, it is imperative for every sector to begin thinking about the impact of COVID-19 and surveying its potential outcomes, in any case recuperation of the sector might be excessively moderate and past the point of no return. This applies to the education and agricultural sectors of the country.

1. Goolam, (2020) opined that, within educational segments, all methodologies must be encompassing and include all partners, such as private sector. Each unit state in Nigeria should set up a team on education under the initiative of the applicable service to study the circumstance, recommend quick and transient measures and be prepared to impact changes when the lockdown (emergency) is terminated.
2. Government should provide Schools with assets needed to rebuild the misfortune in learning, after the lockdown. How these assets are utilized, and how to focus on the students who were particularly hard hit, is an open inquiry.
3. Managers of educational sector and international partners should promptly institute or scale up Coronavirus related education activities and programs among families and communities all over the nation. Self-learning and family/ community-based education are considered key elements in confronting the constraints that have arose due to the effect of the COVID-19.
4. Government at federal and state levels should increase farm-to-market delivery of agricultural produce in order to protect food shortages and high prices.
5. During the lockdown, government of Nigeria should provide stimulus packages such as cash transfer to every family to boost the income of the individual and family.

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EFFECT OF LEARNING STYLES ON STUDENTS' ACADEMIC ACHIEVEMENT ON SERVICE STATION MECHANICS MODULE AT TECHNICAL COLLEGE LEVEL IN ADAMAWA STATE

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Abstract: *This study investigated the effect of learning styles on students' academic achievement in service station mechanics module of Motor Vehicle Mechanics (MVM) at technical colleges in Adamawa State. Two research questions and two hypotheses were set to guide the study. 26 students made up the experimental group and 24 students in the control group for the study; giving a total of 50 NTC II technical students drawn from the three Adamawa State owned technical colleges made up the sample for the study using random sampling technique. The instrument for data collection was Service Station Achievement Test (SSAT), which was a multiple-choice question of 30 items developed by the researchers and validated by three experts for face and content validity. The reliability coefficient of SSAT was found to be 0.87 using Cronbach Alpha after trial testing on year II students of GSTC Gombe, Gombe state. Both groups were pre-tested to determine their level of entry before treatment was administered to the experimental group. The groups were found to be equivalent in their achievement. Data was analysed using means, percentage, standard deviation, t-test and ANCOVA using SPSS version 26. Mean was used to answer research questions, while t-test was used to test the Hypotheses at 0.05 level of significance. The findings of the study revealed, among others, that VAK learning styles enhances students' achievement in service station mechanics in MVM. This is because the three sensory modes are brought into play in the classroom thereby arousing the interest of students to learn. Hence, the study recommended that VAK learning style should be adopted as a teaching strategy at technical college level.*

Keywords: *Visual, Auditory and Kinesthetic (VAK), Learning Styles, Students Achievement*

Introduction

One of the major concerns of educators has been to improve the rate and quality of learning. This concern, according to Ekpenyong (2008), led to the study of psychological issues such as cognitive styles and the development of cognitive maps as a basis for helping individuals to learn. Learning is the process through which behavioural changes occur when a person gains knowledge, comprehension or mastery through experience or study. Furthermore, learning could also mean a process of fixing in the mind or memory through experience and the ability to recall an experience to the mind again or after sometime (Bower & Hilgard, 1986). From these statements, it is clear that individual differences exist when it comes to learning because of behavioural changes and the interpretation of the same experience vary from one individual to the other. Educators accept that all learners are not the same (Guild, 2001). Guild observed that uniformity continues to dominate school practices. Students use the same textbooks and the same materials for learning. They study the same content and work through the same curriculum on the same schedule. Teachers talk with whole groups of students, delivering the same information at the same time to everyone. These practices marginalize other students and results in difficulty in learning. According to Threeton and Walter (2009), such difficulty could be related to lack of students' interest in the curriculum or it could be that the subject was taught in a manner that did not correspond to their learning style.

Learning in a structured educational setting may be thought of as a two-step process, which includes the reception step and processing step. Felder (2009) pointed out that the reception step may involve seeing, hearing, reading or doing while processing step may involve simple memorization, inductive, deductive reasoning, reflection, action, introspection or interaction with others. Felder further opined that how much a student learns in a class is affected in part by the students' learning styles. Learning styles classify students according to the ways they receive and process information (Wagaman, 2008; Bolaji, 2010). That is, all learners have individual difference in the learning processes. That is to say that what may trigger off concentration and interest and maintain it during a lesson vary from one student to the other. According to Stiller (2010), some

people are able to learn through pictures (visual), sounds (auditory) and touch (kinesthetic). The neglect of the students' preference to learning according to www.funderstanding.com (2009) excludes other aspects of the learner's brain from being engaged in the learning process which could have made learning more enjoyable. Hence, exploring other learning processes that could enhance learner's effectiveness in the learning process is necessary if all learners are to benefit from teaching. The quality of learning that the student displays will ultimately depend on the quality of the teaching he receives and how his interest and preference for learning was taken into consideration by the teacher during the teaching process.

One of the fields of education that promotes national growth is science, technical and vocational education. The Federal Republic of Nigeria (2014) stated that the goals of technical and vocational education (TVE) include provision of adequately trained manpower in sciences, technology and business particularly at craft, advanced craft and technician levels, amongst others. Motor Vehicle Mechanics Works is one of the courses taught in technical colleges it involves the application of specific knowledge in the design, selection of materials, construction, operation and maintenance of automobiles (Idris, 2012). The trade is aimed at equipping students with skills that would make them self-reliant and trained special work force for automobile and transportation industry, who can service, repair and maintain cars and commercial vehicles. Service Station Mechanics Module (SSM) is a module of MVMW that deals specifically with the servicing, repair and maintenance of automobiles. In order to attain the goals of MVMW, students must be seen to be thoroughly taught since this can only happen when students receive and process information presented by the teacher in a manner that would help the students to achieve with ease the procedures involved in automobile servicing, repair and maintenance. This information should be presented along with the students' learning style in mind if it is to be helpful to them.

Statement of the problem

It is common knowledge among teachers that individual differences exist among students in every learning situation. Therefore, teachers are expected to recognize and take into consideration these differences in preparing and delivering their lessons. This is to ensure that all learners benefit from the teaching-learning process. However, according to Dryden and Vos (2005), despite the knowledge among teachers that students differ when it comes to learning, many of our schools operate as if each person is identical. This attitude creates learning disorder, which tends to classify students as either 'brilliant' or 'dull' or 'poor'. The situation in our schools however does not reflect the incorporation of learning styles which constitutes a great problem to the attainment of technical college mandate of producing skilled work force at craft level.

Purpose of the study

The purpose of the study was to investigate the effect of learning styles on students' achievement on Service Station Mechanics Module at technical college level in Adamawa State. Specifically the study sought to:

1. Determine the entry level of students on Service Station Mechanics Module at Technical College level in Adamawa State.
2. Determine the post-test mean achievement scores of students in routine maintenance when taught using VAK learning styles and lecture method on Service Station Mechanics Module at Technical College level in Adamawa State.

Research questions

1. What are the pre-test mean achievement scores of students' on Service Station Mechanics Module at Technical College level in Adamawa State?
2. What are the post-test mean achievement scores of students' in routine maintenance on Service Station Mechanics Module when taught using VAK learning styles and lecture method at Technical College level in Adamawa State?

Hypotheses

H_{O1}: There is no significant difference in the pre-test mean achievement scores of students' in experimental and control groups on Service Station Mechanics Module at Technical College level in Adamawa State.

H_{O2}: There is no significant difference in the post-test mean achievement scores in routine maintenance on Service Station Mechanics Module of experimental and control groups.

Methodology

The research design used for this study was the experimental control group design. This design was chosen because students were assigned to experimental and control groups randomly. According to McQueen and Knussen (2006), when respondents in a research are randomly assigned to experimental and control groups, the design is experimental design. The target population for this study consisted of all students offering MVM in all the technical colleges in Adamawa State. Purposive sampling technique was used to select two technical college; Government science and Technical College Yola and Government Science and Technical College Numan. Simple random sampling technique was adopted to assign 26 students as experimental and 24 as control groups. This was done to eliminate bias and provide equal chance for each student. The instrument for data collection was the Service Station Achievement Test (SSAT). It consists of thirty multiple choice objective questions, each item had four options lettered A – D. The instrument was subjected to face and content validation by three experts two from MAUTECH. Yola and one from Abubakar Tafawa Balewa University Bauchi, (ATBU).The reliability coefficient, r, of SSAT obtained using Cronbach Alpha was 0.87 after administering the multiple-choice test (SSAT) on TC II MVMW students of GSTC Gombe, Gombe state.

The treatment procedures involved presentation of information, which was tailored towards the three learning styles. Lesson plans for Visual, Auditory and Kinesthetic learning styles were prepared and used during the lessons. Each lesson plan was used for a lesson and then a test was administered to assess the achievement of the students. An interval of two weeks was given between lessons to reduce or cancel the chances of recall. This interval, according to Nworgu (2010) is enough to cancel out the possible advantage of history and maturation. Both the experimental and control group were administered the SSAT to obtain pre-test scores. The experimental group was taught the selected topics in MVM using Visual, Auditory and Kinesthetic instruction tips, while the control group was taught the same topics using lecture method. The two groups were taught by the researcher and two trained research assistants. In order to eliminate experimental bias due to difference in teacher effectiveness and teaching approach, lesson plans was prepared to guide the teaching. The treatment lasted for six weeks with a lesson each week. The last week was used for administering the post-test. Data was analysed using Means, percentage, Standard Deviation, t-test and ANCOVA. Mean was used to answer the research questions while t-test was used to test the null hypotheses at 0.05 level of significance using SPSS statistical package. Decision Rule: any total mark less than 40 was taken to mean fail while marks equal or above 40 was regarded as pass. This was based on NABTEB grading system.

Result

Table 1: Pre-test Mean Achievement Scores of Students on Service Station Mechanics Module in the Experimental and Control Groups

Variable	N	$\bar{X}$	Remarks
Experimental	26	35.34	Fail
Control	24	36.79	Fail

The result in Table 1 shows that the mean achievements in the pre-test were 35.34 and 36.79 for experimental and control groups respectively. These scores are F grades. These means they are almost equivalent and none of the students passed the pre-test achievement test.

Table 1: Post-test Mean Achievement Scores of Students on Service Station Mechanics Module in the Experimental and Control Groups

Variable	N	$\bar{X}$	Remarks
Experimental	26	78.35	Pass
Control	24	36.79	Fail

Table 2 shows that all the 26 students in the experimental group passed the post-test achievement test with a mean of 78.35 while the control group has a mean of 36.79. These results show that the performance of the students in the experimental group has improved while that of the control group did not.

Table 3: t-test Mean Difference in Pre-test Achievement of Students on Service Station Mechanics Module in Experimental and Control Groups

Variable	N	$\bar{X}$	SD	df	t_{cal}	t_{crit}	Decision
Experimental	26	35.34	10.79				
				48	0.644	1.645	Accepted
Control	24	36.79	13.84				

Table 3 shows that there was no significant difference in the mean achievement of students in the experimental and control groups at the start of the study before treatment. The pre-test means are 35.34 and 36.79 for experimental and control groups respectively. This indicates that the entry level of the students was equivalent. The calculated value of t was 0.644, which was within the t critical value of 1.645. Therefore, the null hypothesis was accepted.

Table 4: t-test Mean Difference in Post-test Achievement of Students on Service Station Mechanics Module in Experimental and Control Groups

Variable	N	$\bar{X}$	SD	df	t_{cal}	t_{crit}	Decision
Experimental	26	78.35	10.27				
				48	11.974	2.018	Rejected
Control	24	36.79	13.84				

Table 4 shows that the experimental group has a mean of 78.35 while the control has a mean of 36.79. The t calculated value of 11.974 is greater than the t critical value of 2.018. Therefore, the null hypothesis was rejected.

Findings

1. The entry level of the students that participated in the study was equivalent as none of them passed the pre-test and their mean achievement was in the range of 34% to 37%.
2. VAK learning styles improved the mean achievement of students on Service Station Mechanics Module. This was evident in the post-test mean achievement of the experimental group whose pre-test mean score was 35.34 and post-test mean score of 78.35.
3. Lecture method of teaching, which was used in the control group, does not favour students' learning. This was proved by the lack of change in mean achievement of 36.79 in pre-test and post-test of the control group.

Discussion of the findings

The study found out that the experimental and control groups were equivalent in mean achievement prior treatment. Research question one was purposely raised to determine the entry level of the students and it was found that they are the same level of achievement for the experimental and control groups before treatment.

The second finding of the study revealed that VAK learning Style improved the mean performance of students. This finding is in agreement with that of Felder (2010) who found out that learning style impacts on learning and academic achievement. This finding also agrees with the findings of Stiller (2010) who found that when learning experiences are tied to the students learning style, their performance does change. Similarly, it agrees with the findings of Renou (2011) who found out that teaching student in the three sensory modes – auditory, visual and kinesthetic – help students to retain and retrieve far more information than they would if they are exposed to only one learning style. The findings of the study further revealed that lecture method does not improve students' academic achievement. This agrees with Peter (2014) who found that there is a high rate of failure among MVM students in technical colleges due to un-motivating and unchallenging methods and approach used by their teachers.

Conclusion

This study was carried out to determine the effect of learning styles on students' achievement in technical colleges in Adamawa State. The study was guided by two purposes, two research questions and two hypotheses. An experimental design was used to source relevant data. Two Adamawa State owned technical colleges were used in the experiment and the students were randomly assigned to the experimental and control groups. The experimental group was taught using VAK learning styles while lecture method was used for the control group. A total of 50 respondents were used and the instrument for data collection was a teacher-made multiple-choice objective question of 30 items. The instrument was based on the official curriculum as approved by the Federal republic of Nigeria. A table of specification was used to ensure validity of the SSAT. Data collected was analysed using mean and standard deviation for the research questions. The hypotheses were tested using t-test and ANCOVA at 0.05 level of significance. Based on the findings of this study it could be concluded that the high achievement in the experimental group can be attributed to the use of VAK learning styles, which presented learning to the students in a manner that triggers their brain to assimilate. Therefore, VAK learning styles are effective in improving students' academic achievement on Service Station Mechanics Module of MVMW.

Recommendations

1. VAK learning styles should be used in teaching MVMW modules at technical college level.
2. MVMW teachers should be trained through workshops on how to incorporate students' students learning styles into their teaching.
3. VAK learning styles should be adopted as teaching strategy for MVMW to improve students' academic achievement.
4. Adamawa State Government should liaise with relevant bodies and agencies to produce text and other materials that are based on VAK learning styles for MVMW.

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IMPROVING INSTRUCTIONAL DELIVERY IN TECHNICAL VOCATIONAL EDUCATION AND TRAINING FOR SKILLS DEVELOPMENT IN THE ERA OF COVID-19 PANDEMIC IN NIGERIA

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Abstract: *The study sought to find out ways of improving instructional delivery in TVET for skills development in the era of covid-19 pandemic. Two research questions and two null hypotheses tested at 0.05 level of significance guided the study. A cross sectional research design was used with a population of 118 TVET trainers (94 TVET teachers and 24 technicians) from four randomly selected tertiary institutions in Nigeria. No sampling was done because the population was manageable. A 29- item structured questionnaire tagged "Instructional Delivery in TVET (IDTVET)" drawn on a 4-point scale was used for data collection by the researchers. The research instrument was validated by three experts in the department of Technology and Vocational Education, Nnamdi Azikiwe University, Awka. A split half method was used to determine the reliability of the instrument which gave a reliability coefficient of 0.89 using Spearman Brown prophecy formula after analyzing the data indicating that the questionnaire was reliable for data collection. Mean and standard deviation were used to answer the research questions while the t-test statistics was used to test the hypotheses at 0.05 level of significance. Findings of the study depicts that the respondents all agreed that a lot of challenges such as abrupt introduction of distance/online teaching and learning occasioned by lockdown were encountered by TVET Trainers during the COVID-19 Pandemic. The study recommended among others that TVET programmes should be strengthened to respond to future disruptions in teaching and learning through training and retraining in digital tools and modern learning technologies.*

Keywords: *Technical Vocational Education & Training, Skill Development, COVID-19 Pandemic*

Introduction

Improvement is the ability or condition of being better than before. According to Sega (2005), improvement is a process of economic, social, political and cultural change in a given society engineered by the efforts of all stakeholders. These stakeholders may include teachers/trainers, local communities and financial partners with a view to improving the living conditions of the citizens through skill development. The trainers through the use of appropriate instructional delivery techniques can produce graduates with basic and relevant skills to become employable. Hence, Onah, *et al.,* (2018) revealed that instructional delivery techniques are not only necessary but essential for developing skills which will be useful in the labour market. Yalams (2017) suggested that instructional delivery in skill courses has to be improved from time to time so as to conform to the current societal needs.

TVET plays a very vital role in developing skills needed to meet the fast changing demands of the labour market. In order to achieve this goal, appropriate instructional delivery technique in TVET should be applied and improved upon by the trainers. According to Oguntuyi (2017), TVET is a structured programme, aimed at providing recipients with the necessary knowledge and skills to continue their studies in the tertiary education level or be integrated into the labour market. Hence, in the era characterized by the rapid technological changes, health and economic uncertainties, it is imperative that stakeholders develop instructional delivery tand redesign curricula to take care of the varied needs of all members of the society. According to Adigun (2017), the contribution of TVET to the Nigeria's Gross Domestic Product (GDP) depends on the quantity and quality of the labour force and services it produces. This in turn depends on the quality of TVET delivery hence the need for adequate funding of the programme for improvement. Akinyemi (2018) agreed that TVET is a crucial platform for acquisition of skills and knowledge for employment and sustainable livelihood adding that it provides the needed employable knowledge, skills and attitudes necessary for effective performance in the workplace.

Statement of the problem

Undoubtedly, Coronavirus Pandemic (COVID-19) has posed significant challenges to education generally including TVET. According to International Labour Organisations (2020), Covid-19 is one of the most significant health crisis that the world has faced in the past 100 years. It has disrupted peoples' way of daily living including how to work and learn. Consequently, TVET trainers were abruptly introduced to unprecedented online and distance learning occasioned by the new norm of social distancing. Aggarwai (2020) noted that COVID-19 has seriously disrupted skills development around the world such that training and educational institutions have made a massive and unprecedented shift to online platforms and tools as the only way to ensure continued delivery of learning and skills development. However, Aggarwai decried that instructors were not properly trained to deliver online courses and as such adapting TVET curricula and training to online formats was difficult. In the same vein, United Nations (2020) noted that in the higher education sub-sector, while online learning has generally taken place through recorded lectures and online platforms, some universities have postponed teaching and learning until further notice, due to lack of information technology (IT) infrastructure for both students and teachers. Notably, the TVET sector in Nigeria is faced with acute shortage of certified personnel, equipment and infrastructure. Given the severe disruption in TVET delivery, it is of crucial importance to identify adequate, quick, practical and innovative solutions to respond to this crisis through improved instructional delivery for skill development in Nigeria.

Purpose of the study

The main purpose of this study is to determine the strategies for improving instructional delivery in TVET for skill development in the era of covid-19 pandemic in Nigeria. Specifically, the study sought to determine the:

1. Challenges encountered by TVET Trainers in improving instructional delivery for skill development in the era of covid-19 pandemic in Nigeria.
2. Emerging innovations that could be used by TVET Trainers in improving instructional delivery for skill development in the era of covid-19 pandemic in Nigeria.

Research questions

1. What are the challenges encountered by TVET Trainers in improving instructional delivery for skill development in the era of covid-19 pandemic in Nigeria?
2. What are the emerging innovations that could be used by TVET Trainers for improving instructional delivery for skill development in the era of covid-19 pandemic in Nigeria?

Hypotheses

Ho_1: There is no significant difference between the mean responses of TVET teachers and technicians on the challenges which they encountered in improving instructional delivery for skill development in the era of covid-19 pandemic in Nigeria.

Ho_2: TVET Teachers and Technicians do not differ significantly in their mean responses on emerging innovations that could be used for improving instructional delivery for skill development in the era of covid-19 pandemic in Nigeria.

Methodology

A cross sectional survey research design was used in this study. According to Gall, *et al.,* (2007), a cross sectional design is meant to describe survey that involves a single snapshot of data collection from a sample to represent the population to which the findings can be generalized. The population of the study comprises of all the teachers and technicians in the tertiary TVET institutions in Nigeria. A sample of 118 TVET Trainers (94 TVET Teachers and 24 Technicians) was drawn from the four randomly selected tertiary institutions offering TVET across the country.

The instrument used for data collection was a 29 item structured questionnaire, developed by the researchers, titled "Instructional Delivery in TVET (IDTVET)". The instrument was based on four-point Likert type rating scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) with numerical values of 4, 3, 2 and 1 respectively. It subjected to face and content validity by three experts from the Vocational and Technology Education Department of Nnamdi Azikiwe University, Awka. To ascertain the internal consistency of the instrument, a pilot test was conducted at the School of Technical Education, Enugu State College of Education (T), Enugu through research assistants. A split half method was used to determine the reliability of the instrument which gave a reliability coefficient of 0.89 using Spearman Brown prophecy formula after analyzing the data indicating that the questionnaire was reliable for data collection.

Data collection was done by the researchers with the help of two research assistants where 106 out of the 118 administered instruments were retrieved (representing 89.8% return rate). Mean and standard deviation were used to answer the research questions while the t-test statistics was used to test the hypothesis at 0.05 level of significance. Mean values of 2.50 and above were regarded as Agreed while mean values below 2.50 were regarded as Disagreed. Also it was decided that where the calculated t-value was equal or greater than the table t-value, it indicates significant difference, the null hypothesis was rejected but if otherwise, the null hypothesis was accepted.

Results

Table 1: Mean Responses and Standard Deviation of Respondents on the Challenges in Improving Instructional Delivery for Skill Development in the Era of COVID-19 Pandemic in Nigeria

S/N	Items	Teachers			Technicians		
		$\bar{X}_1$	SD_1	Decision	$\bar{X}_2$	SD_2	Decision
1.	Inadequate infrastructure	3.67	0.66	Agreed	3.70	0.54	Agreed
2.	Inadequate electricity supply	3.90	0.85	Agreed	3.82	0.79	Agreed
3.	No internet enabled devices	3.25	0.78	Agreed	3.36	0.48	Agreed
4.	Increased cost of data charges	4.28	0.69	Agreed	3.57	0.55	Agreed
5.	Poor internet connection	3.48	0.93	Agreed	4.39	0.83	Agreed
6.	Repeat of lectures after lockdown	4.30	0.70	Agreed	3.62	0.68	Agreed
7.	No materials due to lockdown	2.36	1.10	Disagreed	2.29	0.70	Disagreed
8.	No practical training due to lockdown	3.89	0.54	Agreed	3.74	0.52	Agreed
9.	Examinations not conducted	3.88	0.81	Agreed	3.36	0.75	Agreed
10.	Trainers lack online teaching skills	3.27	0.84	Agreed	3.72	0.49	Agreed
11.	Rural areas lack of access to the internet	4.84	0.72	Agreed	3.99	0.62	Agreed
12.	Decline in quality of training	3.76	0.67	Agreed	3.59	0.55	Agreed
13.	Lack of motivation for trainers	4.22	0.59	Agreed	4.18	0.72	Agreed
14.	No questions in social media	3.47	0.62	Agreed	3.26	0.60	Agreed
	Grand Mean/SD	**3.76**	**0.75**		**3.61**	**0.64**	

Data presented in Table 1 revealed that the respondents agreed to all the items except item 7 with a mean value less than the criterion mean of 2.50. The grand means of 3.76 and 3.61 for ndicate that the respondents generally agreed that a lot of challenges are confronting the instructional delivery in TVET for skill development especially in the era of COVID-19 pandemic in Nigeria.

Table 2: Mean Responses and Standard Deviation of Respondents on the Emerging Innovations for Improving Instructional Delivery for Skill Development in the Era of COVID-19 Pandemic in Nigeria

S/N	Items	Teachers			Technicians		
		$\bar{X}_1$	SD_1	Decision	$\bar{X}_2$	SD_2	Decision
1.	Increase availability of distant learning	3.96	0.83	Agreed	3.83	0.58	Agreed
2.	Video conferencing like zoom	3.68	0.68	Agreed	3.54	0.52	Agreed
3.	Use of You Tube	3.36	0.57	Agreed	3.28	0.49	Agreed
4.	Developing blogs/discussion forum	3.00	0.94	Agreed	3.18	0.83	Agreed
5.	Developing new written resources	3.59	0.74	Agreed	3.42	0.75	Agreed
6.	Use of Simulations	3.66	0.66	Agreed	3.78	0.48	Agreed
7.	Use of Podcasts	2.44	0.59	Disagreed	2.32	0.83	Disagreed
8.	Creating virtual learning environment like Goggle classroom	2.26	0.70	Disagreed	2.30	0.62	Disagreed
9.	Use Television and Radio	3.82	0.82	Agreed	3.76	0.77	Agreed
10.	Increase availability of distance learning facilities	3.67	1.09	Agreed	3.43	0.92	Agreed
11.	Use of Whatsapp and email,	3.66	0.95	Agreed	3.56	0.87	Agreed
12.	Develop alternative to practical	3.45	0.71	Agreed	3.64	0.65	Agreed
13.	Use of Histagram, Facebook	3.53	0.58	Agreed	3.61	0.68	Agreed
14.	Develop new training programme	3.88	0.99	Agreed	3.72	0.71	Agreed
15.	Train facilitators in online pedagogy	4.21	0.76	Agreed	4.16	0.44	Agreed
	Grand Mean/SD	**3.48**	**0.77**		**3.44**	**0.68**	

The analysis presented in Table 2 indicates that the respondents disagreed to two out fifteen items on emerging innovations contained in the instrument. With grand means of 3.48 and 3.44 indicate that almost all the emerging innovations are needed for improving instructional delivery in TVET for skill development in the era of COVID-19 pandemic in Nigeria.

Table 3: t-test Analysis of the Respondents' Responses on Challenges in Instructional Delivery for Skill Development in the Era of COVID-19 Pandemic in Nigeria

Respondents	N	$\bar{X}$	SD	DF	t-cal	t-crit	Decision
Teachers	86	3.76	0.75				
				104	0.91	1.960	Not Significant
Technicians	20	3.61	0.64				

From the result in Table 3, it shows that at 104 df, the t-calculated value of 0.91 is less than the t-critical value of 1.960 at 0.05 level of significance. Therefore the null hypothesis is accepted. This indicates that there is no significant difference in the mean response of TVET Teachers and Technicians on the challenges encountered by TVET Trainers in improving instructional delivery in TVET for skill development in the era of COVID-19 pandemic in Nigeria.

Table 3: t-test Analysis of the Respondents' Responses on Emerging Innovations for Instructional Delivery for Skill Development in the Era of COVID-19 Pandemic in Nigeria

Respondents	N	$\bar{X}$	SD	DF	t-cal	t-crit	Decision
Teachers	86	3.48	0.77				
				104	0.23	1.960	Not Significant
Technicians	20	3.44	0.68				

The result in Table 4 showed that at 104 df, the t-calculated value of 0.77 is less than the t-critical value of 1.960 at 0.05 level of significance. Therefore the null hypothesis is accepted indicating that there is no significant difference in the mean response of TVET Teachers and Technicians on the emerging innovations that could be used in improving instructional delivery in TVET for skill development in the era of COVID-19 pandemic in Nigeria.

Findings

1. COVID-19 pandemic has posed significant challenges to TVET instruction.
2. ICT equipment, devices and digital skills of TVET trainers are indispensable toold in the era of COVID-19 pandemic. Whatsapp was used more to share lecture notes in some courses
3. Infratructural dearth and challenges access hampers efforts ICT implementation.

Discussion of findings

The findings in Table 1 generally revealed that COVID-19 pandemic has posed significant challenges to TVET instruction. TVET trainers and students have struggled with online and distance education, which was introduced abruptly under the new norm of social distancing. TVET institutions more especially experienced a major challenge of providing hands-on practical training using tools and machines through online training. This finding is line with the views of Hayashi and Matsuda (2020) who stated that current TVET instructors and students have struggled with online and distance education, which was introduced abruptly under the new norm of social distancing. As such TVET institutions experienced the significant challenge of providing hands-on practical training using tools and machines through online training. This turbulence, according to Hayashi, *et al.*, (2021) will have a negative impact on the employment outcomes of TVET graduates who will not be adequately equipped with skills. International Labour Organisations (2020) further stated that these challenges were experienced because TVET mangers, trainer and learners were not adequately prepared for this abrupt transition to remote learning, given the lack of necessary skills and infrastructure to accommodate distance teaching and learning.

The findings in Table 2 highlighted the importance of infrastructure (networks, ICT equipment and devices) and the digital skills of TVET trainers, as they become crucial for ensuring an equitable and optimal learning environment, especially in the rural areas. This finding is in line with assertion of ILO, (2020) which stated that the COVID-19 crisis has become a catalyst for TVET providers worldwide to develop innovative learning solutions in a short period of time and it has accelerated the provision of online distance learning at an unprecedented pace and scale, thanks to digital tools and modern learning technologies. Aggarwai (2020) also stressed that although the shift to online learning during the pandemic was seen as an emergency response, the crisis has also provided an opportunity for developing more flexible learning solutions in the future using the online format. In Tables 3 and 4, the respondents through the result of the test of hypotheses indicate that both TVET Teachers and Technicians were in agreement with the challenges and emerging innovations that could be used by TVET Trainers in improving instructional delivery for skill development in the era of COVID-19 in Nigeria.

Conclusion

The COVID-19 pandemic has affected economies, academic activities and societies around the world and caused an unprecedented fall in economic activity, the loss of working hours and income, and a sharp rise in unemployment and underemployment. In fact the shock of COVID-19 pandemic on education including TVET has been unprecedented. It has set back the attainment of TVET goals of producing adequate and skilled manpower for the labour market. The key question is how all these new learning systems and achievements can be sustained to ensure long-term positive impacts at the system level and an equitable, flexible and effective learning environment for all. Hence, the pandemic has challenged some of the current TVET strategies, systems and processes, while highlighting existing gaps. We are all expected to respond to these challenges and gaps by searching for innovative ways to improve instructional delivery of TVET for skill development especially in the era of COVID-19 pandemic in Nigeria.

Recommendations

1. Government should improve internet infrastructure and ensure affordable connectivity
2. Government and private sectors should invest in the development of adequate crisis-response plans for the education sector especially TVET at all levels.
3. Policy makers should inculcate successful emerging innovations in online training programmes, learning platforms and resources into the TVET system.
4. Government should develop and reinforce capacities of TVET Trainers, students and institutions to adjust to constantly evolving circumstances whether COVID-19 or any other future crisis.
5. Government should provide financial support for TVET Trainers and students to enable them access the internet and hardware devices for teaching and learning.
6. Government should establish monitoring and evaluation conditions for distance teaching and learning of TVET programmes.

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IMPACT OF AUTOCAD ON ACQUISITION OF SCIENCE PROCESS SKILLS AMONG BASIC TECHNOLOGY STUDENTS IN COVID-19 PANDEMIC IN NIGER STATE

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***Abstract**: This study investigated impact of AutoCAD on the acquisition of science process skills, among Basic Technology students in Technical Colleges in Niger State. Quasi-experimental Control Group Design, which employed a pretest, posttest, and post- posttest of the experimental and the control group, was adopted for the study. The population of the study consisted of all the Students in public Technical Colleges in Niger State. A total number of 200 students intact classes of TCII was used for the study. The instruments used for the study were Basic Technology Performance Test (BTPT) with reliability coefficient of 0.89 and Process Skills Acquisition Test (PSAT) with reliability coefficient of 0.76. Both instruments were validated by three senior lecturersResearch questions were answered using descriptive statistic of mean and standard deviation, while the hypotheses were formulated and tested using t-test at P≤0.05 level of significance. Findings of the study revealed that the use of AutoCAD has positive effect on students' acquisition of science process skill, retention, and performance among basic technology students. Based on the research findings recommendations were made among which include, that the State Ministry of Education should provide adequate Information Technology gadgets such as computers and software/instructions which are the basic equipment needed for the implementation of AutoCAD as a method of teaching.*

***Keywords:** AutoCAD, Basic Technology, Process Skills, Technology Education*

Introduction

AutoCAD or commonly known as Computer Aided Design is a software application for writing and design 2D and 3D. AutoCAD is the most common computer aided program and architects that are finding it indispensable in bringing drawings and plans of the project engineering work to the verge of perfection. AutoCAD is a software application for both 2D and 3D Computer-Aided Design (CAD) and drafting. It such program. It has many, many aids to drawing construction plans and detail drawings. If changes ICT has greatly influenced Students-Skills in the use of computer programme and that the lecturer enjoys, teaching engineering drawing with computer aided instructional material. Science and technology education plays a vital role in the socio-economic development of all nations. In view of this, developed countries like Britain, Australia, United States of America, Japan, to mention but a few are stressing the need for discoveries in fundamental materials of importance in all fields of sciences. This is done at an incredible rate through pursuing scientifically and technologically related programs in the institutions of learning. Bala (2010) asserted that in developing nations like Nigeria, various factors have contributed to the decay in the educational system, among which is the misinterpretation of the nature of science and science education which can as well lead to in appropriate teaching that reduces the potential impact of science education as a tool for development in Nigeria. For a country to achieve national development, science and technology has to be taught in a well-structured pattern involving activities for both teachers and students. However the low performance of students in sciences as reported by the National Center for Science Education (2012) has put science education in the nation in a state of crisis. Efforts were made by various curriculum developers in Nigeria with a view to address this issue, for example, the development of the Comparative Education Study Adaptation Center (CESAC) in 1968; the establishment of the Nigerian Integrated Science Project in 2009; as well as the Science Teachers Association of Nigeria (STAN) in 1970. The progress in the teaching and learning of science concepts still remained very slow, in spite of the introduction of the 6-3-3-4 system of education. However the problem of the implementation was partly due to the non-availability of personnel, materials, funds and administrative will. Hence, this study investigates the effect of AutoCAD on the acquisition of Basic Technology process skills, retention, and performance among Basic Technology students in Niger, Nigeria.

Basic Technology is the science taught at the primary and junior secondary level in Nigeria. The syllabus of Basic Technology is designed with a lot of activities, as such methods used for its teaching should be in such a way that it will allow the learner to learn through the activity based method of teaching. National Teachers Institute (2017) reported that methods of teaching Basic Technology should include the guided discovery method which is resource based. The mastery of Basic Technology concepts cannot be fully achieved without the use of instructional learning materials; hence the teaching of Basic Technology without learning materials can result to the inability to recall the learned materials, and consequently result to lack of acquisition of the science process skills, poor retention ability as well as poor academic performance. Franzers *et al.* (2012) stressed that a professionally qualified science teacher cannot be able to put ideas into practice if equipments and materials necessary to translate competence into reality are lacking. Yusuf (2015) described instructional or teaching materials like the computer, the projector and the like as those items used by the teacher to pass information to students. Achimugu (2010) posited that students comprehend and remember better when teaching materials are employed in the teaching-learning process. Ayua (2011) revealed that there are materials which can be used effectively to teach Basic Technology in order to make learning experience effective. Expectedly, instructional materials if carefully and properly planned may enhance the teaching and learning of Basic Technology, and make it enjoyable, interesting, and exciting. It is in this regard that this research work intends to use a personalize computer software package as a form of teaching resource for the teaching of Basic Technology in order to asses if it will be effective in the acquisition of science process skills, retention and performance among Basic Technology students in Niger Metropolis, Nigeria.

Statement of the Problem

Research studies like Allahoki (2012) stated that in Africa, the teaching and learning of Basic Technology is dominated by the lecture method and is thought to be the major reason for learning disability and lack of interest on the part of the learners. The Federal Republic of Nigeria (2013) states its objectives for science education is to cultivate the spirit of inquiry, produce competent scientist and to provide knowledgeable scientists. Usman (2014) called on the need to transform the teaching of science with a view to assisting the teaming youths to acquire skills that will make them self-reliant. Muoneme (2013) explained that the teacher and his method of teaching may have been the major cause of student's poor academic performance in Basic Technology as most teachers still prefer using the "chalk and talk" method i.e. the lecture method. The lack of trained teachers that can alter the conventional teaching methods to modern teaching strategies, as well as non use appropriate instructional ,material for the teaching and learning process are all as factors resulting in poor performance among learners of science. The situation in Niger State is a clear indication of the poor performance.

Objectives of the Study

This study intends to find out the impact of AutoCAD on the acquisition of process skills among Basic Technology students in Niger Metropolis. Specifically, it sought to

1. Find out the difference in performance among students taught Basic Technology concept using AutoCAD and those taught using Lecture Method
2. Examine the difference between the Science Process Skills Acquired in students that were taught Basic Technology concept using AutoCAD and those taught using Lecture Method

Research questions

1. What is the difference in the level of performance between students taught Basic Technology concept using AutoCAD and those taught using lecture method?
2. What is the difference in the science process skills acquired in students that were taught Basic Technology concept using AutoCAD and those taught using lecture method?

Hypotheses

H_{O1}: There is no significant difference in the level of performance between students taught Basic Technology concept using AutoCAD and those taught using lecture method.

H_{O2}: There is no significant difference in the acquisition of Science Process Skills among students taught Basic Technology concepts using AutoCAD and those taught using lecture method.

Methodology

The research design adopted for this study is a quasi-experimental control group design employing pretest, posttest and post-posttest. All the students in Niger State Technical Colleges formed the population for the study. The sample for this study consists of 200 NTC II students in intact classes from four technical colleges in Niger State. Two instruments were used for data collection are Basic Technology Performance Test (BTPT) and process Skills Acquisition Test (PSAT). They were validated by three experts in Industrial and Technology Education Department, Federal University of Technology, Minna. A Pilot study was carried out on NTC II students of Federal Technical College FCT-Abuja. For the test re-test, two weeks was allowed to elapse between the first test and the second test, in order to minimize the intervention of external factors in the final reliability coefficient that would be obtained. Both instruments were administered at the beginning of the exercise as pretest to determine the entry level of the students. The research questions were answered using descriptive statistics of mean and standard deviation. Inferential statistical of t-test was used to test the research hypotheses at $p \leq 0.05$ level of significance.

Results

Table 1: Mean Difference between the Performance Scores in Basic Technology Concepts of Experimental and Control Groups

Group	N	Mean pretest	Mean posttest	SD	MD
Experimental	100	12.19	27.75	3.63	
					8.69
Control	100	11.86	19.06	2.35	

Table 1 revealed that there was a difference in the performance between students taught Basic Technology concept using AutoCAD and those taught using lecture method. The pretest mean scores of experimental and control groups are 12.19 and 11.86 respectively. The posttest mean scores of performance between the Experimental and Control groups are 27.75 and 19.06 respectively with mean difference of 8.69 in favor of the experimental group.

Table 2: Mean Difference between the Process Skill Acquired in Basic Technology Concepts by Experimental and Control Groups

Group	N	Mean Pretest	Mean Posttest	SD	MD
Experimental	100	6.33	9.69	4.85	
					2.48
Control	100	6.01	7.27	2.64	

Table 2 revealed that there was a difference in the acquisition of Science Process Skills between students taught Basic Technology concept using AutoCAD and those taught using lecture method. The pretest mean scores of Experimental and Control groups were 6.33 and 6.01 respectively. The posttest mean scores of Experimental and Control groups were 9.69 and 7.27 respectively with mean difference of 2.48 in favor of the experimental group. This showed that the mean scores of Science Process Skill Acquisition of the Experimental group were significantly higher than that of the Control group.

Table 3: t-test on the Difference between the Mean Performance Scores in Basic Technology Concepts of the Respondents Experimental and Control Groups

Group	N	$\bar{X}$	SD	Df	t-cal.	p-value	Remark
Experimental	100	24.28	4.18				
				198	19.86	0.00	Significant
Control	100	12.51	2.12				

Significance at p≤ 0.05 level

Table 3 showed that the calculated value of t = 19.86 and p-value = 0.00 at degree of freedom (df) 198. Since the p-value 0.00 at ≤ 0.05. It means that there is significant difference in the mean scores of the Experimental and Control groups. The significant difference is in favour of the Experimental group exposed AutoCAD. Therefore, null hypothesis one was rejected.

Table 4: t-test on the Difference between the Mean Process Skill Acquired in Basic Technology Concepts of the Respondents in Experimental and Control Groups

Group	N	$\bar{X}$	SD	Df	t-cal.	p-value	Remark
Experimental	100	23.71	4.71				
				198	19.86	0.01	Significant
Control	100	10.06	2.21				

Significance at p≤ 0.05 level

Table 4. showed that the p = 0.001 at degree of freedom (df) 198 which indicates that there was a significant difference in the mean score of the experimental and control groups. The significant difference is in favour of the experimental group. With this result, null hypothesis two was therefore rejected.

Findings and discussion of the results

The findings of this study showed that significant difference existed in the level of Performance between students taught Basic Technology concept using AutoCAD and those taught using Lecture method. This finding is in agreement with Nwafor (2014) who investigated on the relative effects of Synchronized Multimedia on the Academic Performance and Motivation of Senior Secondary School Biology Students in Port Harcourt, Nigeria. The result showed that students that were taught Biology using Synchronized Multimedia performed significantly better than those taught using lecture method only. Also the finding this study contradicted with the finding of Putman (2010) who conducted a similar research in Northern Ohio, U.S.A. The study investigated the effect of teaching English Language, Arts, and Mathematics using Power Point Presentation (PPP). The finding revealed that there was no significant difference in students‟ performance among those taught using PPP and those taught using lecture method.

The findings of the present study showed that significant difference existed between the acquisition of Science Process Skills of students taught Basic Technology using AutoCAD and those taught using lecture method in favour of experimental group. This finding is in agreement with Bork (2013) whose findings showed that students that used Personalized System of Instruction (PSI) using computer as teaching aid had significantly acquired the Science Process Skills better, due to interaction with computers. Also the finding of Hui (2013) who conducted a research study on AutoCAD to test the effectiveness and satisfaction in language learning at a major University in Hong Kong. Their finding revealed that the use of CAI had helped the students to recall the concepts being learned and showed improved performance. The research proved that AutoCAD supports vocabulary learning better than the lecture method. Neuman *et al.* (2011) also examined whether the use of computer has an effect on students‟ participation during lesson in elementary

schools in the sub-urban area in the United States of America. The finding showed that the use of the computers in the classroom had encouraged students‟ participation during learning, which is an indication of Process Skills Acquisition. The finding of this study contradicted with the finding of Suwaid (2013) who conducted a study on Technology Assisted Learning as a potential for the acquisition of Basic Technology process skills and ICT skills by school children. The study revealed that there was no significant difference in the performance of children exposed to TAL and those that were not. Impliedly it proved that association with games (simple technology tools) has no effect on students' performance.

Conclusion

On the basis of the study findings, the use of AutoCAD has brought an impact on the acquisition of science process skill, retention and performance among Basic Technology students. The use of the AutoCAD has increased the overall performance of students especially when pre test and post test scores were compared.

Recommendations

1. Basic Technology teachers in Technical Colleges in Niger State should be encouraged to use the AutoCAD in teaching some concepts in Basic Technology like the drawings, as it improves performance and enhances the acquisition of science process skills.
2. The State Ministry of Education should provide adequate Information Technology equipment such as computers and software, which are the basic equipment needed for the implementation of AutoCAD as a method of teaching.

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PERCEIVED EFFICACY OF VIRTUAL INSTRUCTION DURING THE COVID–19 PANDEMIC LOCKDOWN AMONG THE TEACHERS IN GOVERNMENT SCIENCE AND TECHNICAL COLLEGES IN GOMBE STATE

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Abstract: *As in many countries worldwide, due to the COVID-19 pandemic lockdown, secondary schools in Nigeria closed in March 2020 and only began reopening in October of the same year. As a result of the lockdown, some schools had to quickly move from the traditional face-to-face teaching method to virtual learning. This study aimed to investigate effectiveness virtual instructional strategies during the COVID-19 lockdown as perceived bt the teachers in Government Science and Technical Colleges of Gombe State. Five-point Likert-scale questionnaire was used in the study to elicit the impact of online teaching and students' satisfaction. The population of the study comprised of all the 133 teachers teaching in the 7 Technical Colleges in the state. The two colleges were purposively drawn from different Educational zones of the state. Two colleges were purposively drawn from different Educational zones of the state. These colleges are; Government Science Technical (GSTC) Tula (male boarding), Government Science Technical College Barunde Bypass Gombe (mixed and day). A total of 65 teachers was drawn using stratified random sampling. Mean and Standard Deviation were used to analyse the research questions. The study revealed, among others, that online teaching enhances understanding of virtual tools but essential skills cannot be guaranteed. Consequently, it was recommended that educational institutions should develop contingency strategies and methods that may more effective in emergency situations.*

Keywords: *COVID-19 Pandemic, Virtual Instruction, Technical Education, Skills Acquisition*

Introduction

COVID-19, a novel disease, became known when it was identified as the causative agent in reported cases of patients with pneumonia admitted in hospitals in Wuhan, China, in December 2019 (Munster *et al.,* in Osamudiamen, *et al.,* 2021). This disease is spread through airborne zoonotic droplets, and people can get infected when in close contact with the cough and sneeze of persons who have symptoms from the virus. In March 2020, the World Health Organisation designated COVID-19 also known as Coronavirus a pandemic (World Health Organisation, 2020). Due to this pandemic, educational institutions in most countries around the world were closed. Data from UNESCO showed that the peak in closure of schools sometimes in April 2020, when about 1.6 billion students were affected across 194 countries (UNESCO 2020). In the same suit, the Federal Ministry of Education in Nigeria directed the closure of all schools. COVID-19 pandemic has affected higher education in Nigeria, as well. The closure of schools meant that administrators of higher education had to come up with strategies to ensure that learning continues during the lockdown. Some Nigerian universities particularly the privately owned universities quickly moved from traditional face-to-face teaching method to remote education (Osamudiamen, *et al.,* 2021). As the period of total lockdown extended, more universities quickly switched to online teaching. Both the teachers and students had to adapt swiftly to the new mode of education as they were trained virtually on how to use distance learning tools. Teachers and students faced challenges in adapting to online classes and maintaining the minimal communication to support learning and development. Migrating to remote learning within a short period was difficult, especially in a developing country like Nigeria where advanced technology has not been well integrated into the educational system. Most schools involved in online teaching provided students with learning materials and pre-recorded lecture videos. Remote teaching was done through online learning management systems such as Canvas, Zoom, Edmodo, Google Classroom and Microsoft Teams. Course materials and pre-recorded lectures were also sent to the students' emails, uploaded to learning software and sometimes sent to students WhatsApp groups. Although, several schools in Nigeria were not prepared for any contingency that may affect education such as COVID-19

Pandemic lockdown. Online teaching in Nigeria was both asynchronous and synchronous. In asynchronous learning, students can communicate and complete activities at their own time and pace, while synchronous learning activities occurred through live video and/or audio with immediate feedback (Hrastinski, 2008). Management teams in these universities ensured that the quality of teaching was maintained and appropriate methods which address some of the limitations of remote teaching were used. Essays, presentations, reports, quizzes, assignments, etc. were some of the coursework-related activities adopted, while most assessments were done via virtual multiple-choice questions and oral examinations. Some institutions were able to provide guidance and support to ensure that learning activities continued and students were assessed online. This was mostly possible because school closure occurred in an era when technological innovations and digitalization in educational context are readily available.

Purpose of the study

The major purpose of this study is to explore the educational challenges caused by COVID-19 pandemic lockdown in Government Science and Technical Colleges in Gombe. Specifically, the study aim of the study is todetermine:

1. Perception of the teachers on the efficacy of virtual classrooms in Government Science and Technical Colleges in Gombe State.
2. Perception of the teachers on the efficacy of course learning outcomes in Government Science and Technical Colleges in Gombe State.
3. Perception of the teachers on the efficacy of alternative method of assessment in Government Science and Technical Colleges in Gombe State.
4. Perception of teachers on the efficacy of online teaching in Government Science and Technical Colleges in Gombe State.

Research questions

1. What is the perception of the teachers on the efficacy of virtual classrooms in Government Science and Technical Colleges in Gombe State?
2. What is the perception of the teachers on the efficacy of course learning outcomes in Government Science and Technical Colleges in Gombe State?
3. What is the perception of the teachers on the efficacy of alternative method of assessment in Government Science and Technical Colleges in Gombe State?
4. What is the perception of teachers on the efficacy of online teaching in Government Science and Technical Colleges in Gombe State?

Methodology

Survey research design was adopted. This study aimed to investigate effectiveness virtual instructional strategies during the COVID-19 lockdown as perceived by teachers in Government Science and Technical Colleges of Gombe State. Five-point Likert-scale questionnaire was used in the study to elicit the impact of online teaching and students' satisfaction. The population of the study comprised of all the 133 teachers teaching in the 7 Technical Colleges in the state. Government Science Technical College (GSTC) Gombe, Government Science Technical College Barunde Bypass, Government Science Technical College Deba, Government Science Technical College Kwami, Government Science Technical College Amada Akko, Government Science Technical College Kumo, Government Science Technical Tula. Two colleges were purposively drawn from different Educational zones of the state. These colleges are; Government Science Technical (GSTC) Tula (male boarding), Government Science Technical College Barunde Bypass

Gombe (mixed and day). A total of 65 teachers was drawn using stratified random sampling. Percentages, Mean and Standard Deviation were used to analyse the research questions.

Results

Table 1: Mean and Standard Deviation of the Respondents on the Efficacy of Virtual Classrooms in Government Science and Technical Colleges in Gombe State

S/N	Items	Level of Aggreement (%)				
		1	2	3	4	5
1.	Limited previous experience with use	4.6	7.7	6.2	49.2	32.2
2.	Appropriate teaching tool	9.2	7.7	18.5	44.6	20.0
3.	Internet connection problem	4.6	7.7	6.2	41.5	40.0
4.	Difficult to use in complex concept	6.2	7.7	6.2	47.7	32.3
5.	Limited students- Teachers interaction	4.6	7.7	6.2	49.2	32.3

Table 1 shows that most of the teachers (> 80%) had limited previous experience when using virtual classrooms. 64.6% of the teachers agreed that they had appropriate teaching tool when using virtual classrooms. Also 81.5% of the teachers agreed that they had internet connection problem during lecture when using virtual classrooms. 81.5% of the teachers agreed that they had limited teacher- students interaction when using virtual classrooms.

Table 2: Mean and Standard Deviation of the Respondents on the Efficacy of Course Learning Outcomes in Government Science and Technical Colleges in Gombe State

S/N	Items	Level of Aggreement (%)				
		1	2	3	4	5
1.	All CLO were covered	9.2	7.7	18.5	44.6	20.0
2.	Essential skills were gained	9.2	40.0	27.7	12.3	10.8
3.	Ineffective for exam assessments	9.2	21.5	46.2	12.3	10.8
4.	Difficult to assess students	9.2	7.7	13.8	49.2	20.0
5.	Grades no longer reflect performance	9.2	7.7	6.2	21.5	55.4

Table 2 shows that about 64.6% teachers agree that course learning outcomes were covered. 49.2% of the teachers disagreed that essential skills were gained. About 46.2% of the teachers were neutral that course learning outcomes are ineffective for exam assessments. 76.9% of the teachers agreed that grades no longer reflect performance.

Table 3: Mean and Standard Deviation of the Respondents on the Efficacy of Alternative Method of Assessment in Government Science & Technical Colleges in Gombe State

S/N	Items	Level of Aggreement (%)				
		1	2	3	4	5
1.	Online exams impractical	13.8	35.4	27.7	12.3	10.8
2.	Dominated by MCQs exams	13.8	7.7	13.8	44.6	20.0
3.	MCQs not appropriate	13.8	32.3	30.8	12.3	10.8
4.	Enhancing students' skills	13.8	7.7	13.8	41.5	23.1
5.	Less exams and more assignment	16.8	15.4	13.8	30.8	23.1
6.	Higher grade during online class	18.5	7.7	13.8	36.9	23.1

7.	Increase in exam malpractice	16.9	7.7	13.8	38.5	23.1
8.	Oral exam more appropriate	18.5	7.7	13.8	43.1	16.9

Table 3 shows that 49.2% of the teachers disagreed that online examinations were impractical. 64.6% of the teachers agreed that alternative method of assessment is dominated by MCQs exams. 46.1% of the teachers disagreed that MCQs are not appropriate. 61.6% of the teachers agreed that there was increase in examinations malpractice. 60% of the teachers agreed that oral exam is more appropriate.

Table 4: Mean and Standard Deviation of the Respondents on the Efficacy of Online Teaching in Government Science and Technical Colleges in Gombe State

S/N	Items	Level of Aggreement (%)				
		1	2	3	4	5
1.	May hinder students' employability chance	9.2	40.0	27.7	2.3	10.8
2.	May decrease students' practical skills	12.3	36.9	27.7	12.3	10.8
3.	May hinder students' performance	9.2	46.2	21.5	12.3	10.8
4.	Enhanced students' understanding of virtual tools	9.2	7.7	18.5	44.6	20.0

Table 4 shows that 49.2% of the teachers disagreed that online teaching may hinder students' employability chance. 49.2% of the teachers disagreed that online teaching may decrease students' practical skills. 55.4% of the teachers disagreed that online teaching may hinder students' performance. 64.6% of the teachers agreed that online teaching enhanced students' understanding of virtual tools.

Findings and discussion

Result from our study revealed that one of the challenges of online teaching as noted by teacherswas the limited interactions they had with one another, and this limited interaction negatively affected student satisfaction significantly. Hunter et al. (2003) have previously proposed that for effective distance learning, student–student as well as student–teacher interaction is fundamental. One way to improve on the interaction between students themselves and also with their teachers is to encourage both the students and teachers to use the discussion forums in their various distance learning tools. Also, the student can create a WhatsApp group strictly for academic purposes where discussion can be done via text or voice notes. teachers claimed that virtual classrooms are ineffective because they are easily distracted. Distractions are part of life, and it is the duty of the student to manage or cut off from every form of distraction. This distraction may be more prominent in students with large families or those using their smartphones for online classes. Some of the ways students can limit distraction is to attend lectures with their laptops instead of smartphones, decrease accessibility to phones during lecture hour and parents/guidance should be a source of encouragement to their children.

A fair number of students claim they did not gain all knowledge and skills expected in some courses taught virtually. One possible reason for this claim may be due to distractions as well as limited student–student and student–teacher interactions. While students agree that the number of assignments was too many and instructions were unclear, teachers favoured more assignments and oral examinations. Result from our study showed that these perceived large number of assignments and unclear instructions negatively influenced student's satisfaction significantly Although many distance learning tools provide platform for online examinations, students tend to have negative perception as they are not invigilated and malpractice becomes inevitable (Kaczmarczyk 2011). Students were not in favour of oral examination, and some of the reasons may be they usually involve wide scope, difficult to prepare for and revision is sometimes less effective (Alqurshi 2020). Most teachers claim that explaining complex scientific ideas or concept to students online was

difficult. In order to make complex ideas simpler, teachers can upload or post a pre-recorded detailed explanation of these concepts for students to watch before the actual virtual lecture. There was need for everybody to adjust to the new normal that was not pleasant and comfortable.

Alternative methods of assessments involving assignments, essays, reports, quizzes, oral assessments, etc. are highly encouraged. Also, problem-based learning (PBL) as part of student-centred teaching strategies is also a suitable method and it is highly encouraged in distance learning (Alqurshi 2020). Some benefits of problem-based learning are that it promotes exchange of ideas among students and encourages independence, unlike traditional face-to-face teaching where students tend to memorize lecture materials (Camp 1996). Our survey revealed that students have gained higher marks during online assessment when compared with traditional face-to-face teaching. Our result is in agreement with Alqurshi (2020), where the author observed higher marks in all courses during COVID-19 lockdown when compared with previous sessions that were not taught virtually. The fact that during COVID-19 lockdown, a fair number of assessments were multiple-choice questions and students can sometimes find answers to questions online may be a possible explanation for the higher marks gained by students. One of the ways to manage these discrepancies in scores is to utilize more of problem-based learning which would encourage critical thinking and make it less easy to find answers online. Some students fear that virtual learning may decrease their practical skills, hence affecting their chances of employment.

It is actually expected that science students doing practical-based courses would fear loss of practical skills since they were mostly taught alternative to practical skills virtually. It is therefore encouraged that practical classes be organized post-lockdown for these set of students. Student's chances of employment would not be affected by online lectures as distance learning using virtual learning tools has been embraced worldwide. We observed that students in their fourth year were less satisfied with the way the institution managed educational processes during the lockdown when compared with students in first to third year. One reason for this observation may be the higher level tends to be more difficult and sometimes involves more practical sessions. Generally, some of the findings from this study were in agreement with the study conducted in Saudi Arabia by Alqurshi (2020) on pharmaceutical education during the COVID-19 lockdown. Statistical analysis revealed that poor network connection influenced student's satisfaction negatively during virtual learning. Therefore, there is need for the government and telecommunication industries to improve on network coverage and broadband services.

Conclusion

The COVID-19 pandemic lockdown affected almost every aspect of the society including everyday life. Education in Nigeria was affected greatly, during the COVID-19 lockdown. The need for novel emergency teaching methods and the switch to remote learning during the pandemic was challenging for both students and teachers. A cross-sectional study was carried out to explore the impact of COVID-19 lockdown on education in Nigeria. Audience targeted questionnaires were developed using Google Forms. The questionnaires were designed to measure satisfaction using five-point Likert scale questions, in four different categories: virtual classrooms, course learning outcomes, alternative method of assessment, and impact of online teaching. Nigerian schools were not left out in this unpleasant situation as some of these institutions had to move quickly from the traditional face-to-face teaching method to virtual learning during the lockdown. The distance learning tool used for online teaching was dependent on the choice of the institution. Many schools members had little or no experience with virtual learning. The lackof student–teacher interactions was the major limitation associated with virtual learning as against the traditional face-to-face teaching method. As most teachers are relatively new to virtual learning, there is need for teachers-friendly guide aimed at helping them with online processes. Teachers should develop interactive online classes to limit student's distraction and also improve satisfaction. Nigerian government, management of higher institutions and telecommunication industries should collaborate to subsidize cost of Internet for teachers. Telecommunication industries should increase Internet coverage and broadband services so as to overcome Internet-related issues. Most

institutions in Nigeria are using distance learning tools and it is recommended that the Federal Government of Nigeria and the Ministry of Education should see the COVID-19 pandemic lockdown as an opportunity to invest and promote virtual learning in Nigerian institutions.

Recommendations

1. A short course addressing the usage of online learning management systems: Zoom, Google Classroom, Edmodo, etc. should be added to the school's curriculum.
2. The Ministry of Education should develop a document outlining student friendly teaching strategies as well as assessment methods. This document may be useful during emergency teaching
3. Practical classes should be organized for practical-based courses post-lockdown.
4. Network providers should improve on their Internet coverage and broadband services as well as subsidize data subscription for teachers.
5. High-speed Internet and equipment facilities should be made available for teachers in their residence outside campus.
6. Most teachers in Government schools in Nigeria are unable to afford a laptop or smartphones, while some of them reside in regions with poor Internet connections. Therefore, the School should lend laptops/tabs to teachers library with clear instructions that these devices must be returned after the lockdown or pandemic crisis

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IMPACT OF COVID-19 PANDEMIC ON CONTENT DELIVERY OF TECHNICAL VOCATIONAL EDUCATION AND TRAINING IN PUBLIC TERTIARY INSTITUTIONS IN NORTH-CENTRAL STATES OF NIGERIA

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Abstract: *The study adopted descriptive survey as the research design using 29 items structured questionnaire title Impact of the Covid-19 Pandemic on the Delivery of TVET and STEM questionnaire (ICPDTSQ) as instrument to retrieve opinions and information from the respondents. Three research questions and two hypotheses were raised for the study. The population for data collection was eighty five (85) respondents involving TVET lecturers and instructors selected from two tertiary institutions in each State (Benue, Kogi, Kwara, Niger, Plateau, and Nasarawa States) of North-Central Nigeria. no sampling technique was used for the study because of the small size of population. Mean and Standard Deviation were used to analysis the data collected and obtained from the research questions while t-test analysis was used to test the hypotheses. 2.50 and above with Standard Deviation of 0.50 was the cutoff point, such that any item with a mean below 2.50 with Standard Deviation below 0.50 was disagreed using SPSS Version 23. It was recommended that TVET and STEM should be given special attention on skills development as other educational programs to counter the COVID-19 pandemic.*

Keywords: *TVET, STEM, Covid-19 Pandemic, Content Delivery, Technical Education*

Introduction

Technical Vocational Education and Training (TVET) is an ideal platform for the acquisition of Science Technology Engineering Mathematics (STEM). STEM education refers to the integrated teaching and learning of the subjects' of Science, Technology, Engineering, and Mathematics. TVET provides a strong foundation for, and serve as a delivery system for STEM competencies and skills for a broader range of students. Hadijah (2015) added that TVET is an ideal vehicle to facilitate STEM due to its focus on innovation and problem solving, combining both paradigms in education and training seems to offer a breakthrough in how to prepare the workforce to be much more effective and productive in the present knowledge based economy. Nevkar and Kpam (2019) defined TVET as skill-based programme designed for specific vocation, TVET upgrades unskilled individual to semi-skilled and semi-skilled to skilled. Skilled individuals are known to be intelligent consumers of modern technologies, creative and innovative. Yaduma and Agada (2018) described TVET as the type of education which provides individuals with skills, knowledge and right attitudes for employment in a specific occupation. Recently, attention has been placed on STEM as a result of the employment gap in STEM-field and the need to meet the demand of technological development of this present time. Nwaokugha and Ezeugwu,(2017), lamented on the lingering job crisis and skills mismatch between labour market needs and training provided by STEM. STEM adequately prepares skilled workers through the provision of relevant skills development programmes and depends largely on the quality of its teachers and trainers for success. Stakeholders and practitioners in the Technical Vocational Education and Training (TVET), sector have rapid advances in Information and Communication Technologies (ICT) from the 90s to our present day. This has created both opportunities and challenges for the design and delivery of education and training. Havice and Pickles (2020) point out that the development and use of ICTs for the delivery of instruction in a face-to-face classroom setting or at a distance was aimed at improving the quality and access to education and training. Therefore an instruction allows the instructor and the learner to interact in different environments at the same time or in different places and times. These learning options enable all learners including those with disabilities to access great flexibility, and eliminating time and place barriers to learning. The use of online platforms for delivering training was accelerated during the pandemic. An online offering are important in mitigating the risk of COVID-19 transmission, and has facilitated the open access to e-resources during the pandemic.

COVID-19 pandemic brought about the cessation of all learning activities in Nigeria except for private universities and secondary schools that swiftly switched to virtual learning platforms. Anyika, *et al.,*(2021) point out that, the pandemic indeed had a huge impact on the educational system in Nigeria. It also illuminated the digital divide between the Nigerian student and his counterparts in other climes. Hayashi and Matsuda (2020) observed that, in the new norm of social distancing, TVET institutions experienced significant challenge of providing hands-on practical training through online training. COVID-19 pandemic outbreak also offered an opportunity for the nation to realise the poor status of its educational system. COVID-19 forced students to continue their education and training online, a learning approach that is not completely new to the TVET and STEM sector. International Labour Organization (2021) points out that, prior to COVID-19,only few TVET institutions provided distance learning. International Labour Organization (2015) opined that, the continuous functioning of the TVET systems is a critical factor for effective delivery of programmes and the development of necessary skills in emerging occupations and in building human capacity for transition towards environmentally sustainable economies and societies. While TVET institutions resumed face- to-face training in June 2020, some institutions remained closed due to the partial lockdown and still continue to rely on online technologies. International Labour Organization (2020) observed that, in the vast majority of countries, TVET schools and training centres are closed as a measure to counter the COVID-19 pandemic. Work-based learning, apprenticeship training and internships are affected by the closure of workplaces. The few businesses that remained opened allow only essential staff to work at their facilities. This allow the quality of learning drop significantly due to difficulty in conducting practical training online and the lack of internet access and digital devices. In addition, TVET graduates in the tourism and hospitality sector as well as self-employed TVET graduates have been the hardest hit. The expectation that TVET could continue during the pandemic was high, although only one in five households owned either a desktop or laptop and other internet accessing devices. Therefore further policy planning and implementation will be benefit from the evidence clarifying the challenges during the COVID-19 pandemic. The direction technological development is taking has created a need to prepare, sensitize, motivate and promote the study of STEM. Hence, the need to critically address the impact of Covid -19 towards STEM education in North-central Nigeria

Statement of the problem

The Impact of the Covid-19 pandemic on the delivery of TVET and STEM in tertiary institutions in North-Central State of Nigeria can be traced to certain challenges. This can be weak resilience of the system to maintain continuity of programme design, delivery, trainees' assessment and certification, and instructor professional development as a result of COVID-19 pandemic. Some of the major problems that have confronted the delivery of TVET and STEM may include TVET schools and training centres are closed as a measure to counter the COVID-19 pandemic. Work-based learning, apprenticeship training and internships are affected by the closure of workplaces. Therefore the paper is set to critically address and counter the impact of Covid -19 proffer solution towards the success of TVET and STEM education in North-central Nigeria

Objective of the study

The main objective of this study is to examine the impact of the Covid-19 pandemic on the delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria. The specific objectives of this study are to identify:

1. The role of TVET lecturers and instructors in content delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria.
2. The impact of the Covid-19 pandemic in content delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria.
3. The strategies for effective content delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria.

Research questions

1. What is the role of TVET lecturers and instructors in content delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria?
2. What is the impact of the Covid-19 pandemic in content delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria?
3. What are the strategies for effective content delivery of TVET and STEM in the tertiary institutions in North-Central States of Nigeria.

Hypothesis

H_{O1}: There is no significant difference in the mean responses of the respondents on their role in content delivery of TVET and STEM in their respective tertiary institutions.

H_{O2}: There is no significant difference in the mean responses of the respondents on the impact of the Covid-19 pandemic on content delivery of TVET and STEM in their tertiary institutions.

Methodology

The study adopted descriptive survey as research design using 29 items structured questionnaire titled Impact of the Covid-19 Pandemic on the Delivery of TVET and STEM questionnaire (ICPDTSQ).Three research questions and two hypotheses were raised for the study. The population for data collection was eighty five (85) respondents involving fifty five (55) TVET lecturers and thirty (30)instructors selected from two tertiary institutions in each state of the North-Central, Nigeria. There was no sampling technique used for the study because of the small size of population. The questionnaire was validated by three expects from Faculty of Vocational and Technology Education, Abubakar Tafawa Balewa University Bauchi, Nigeria. Test, retest was conducted twice at an interval of two weeks with 20 lecturers/instructors from Abubakar Tafawa Balewa University Bauchi, Nigeria. The data generated from the study were then analyzed using cronbach reliability coefficients to obtain 0.87 indicating that the study is appropriate and reliable for the study as it was above 0.60 of reliability index. Mean and Standard Deviation were used to analysis the data obtained and answer the research questions while t-test was used to test the hypothesis with SPSS Version 23.

Results

Table 1: Mean ratings and Standard Deviation in the Responses of the Respondents on their Role in Content Delivery of TVET and STEM in their Tertiary Institutions

S/N	Items	$\bar{X}$	SD	Decision
1.	An increasing prevalence of high-technology	2.55	0.55	Agreed
2.	Jobs requiring support for learning on demand	2.50	0.55	Agreed
3.	Coverage of all concepts TVET and STEM	2.65	0.57	Agreed
4.	Change in the learning course	2.75	0.58	Agreed
5.	Deepening learning to the learned and learner	2.50	0.55	Agreed
6.	Valuing learning	2.55	0.55	Agreed
7.	Providing information, guidance and counseling	2.65	0.57	Agreed
8.	Investing time and money TVET and STEM	2.75	0.58	Agreed
9.	Bringing learners and learning opportunities together	2.60	0.56	Agreed
10.	ensuring basic skills and introducing online interaction	2.65	0.57	Agreed
	Total	**2.62**	**0.56**	**Agreed**

Table 1 shows that the highest to the lowest mean ratings with a corresponding standard deviation ranges from 2.75 to 2.50 and 0.58 to 0.55 indicating that all the items 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 are agreed upon as The roles of TVET lecturers/instructor for Delivery of TVET and STEM in tertiary institution in North-Central State of Nigeria.

Table 2: Mean ratings and Standard Deviation in the Responses of the Respondents on the Impact of the Covid-19 Pandemic on Content Delivery of TVET and STEM in their Respective Tertiary Institutions

S/N	Items	$\bar{X}$	SD	Decision
1.	TVET schools and training centres are closed	3.75	0.80	Strongly Agreed
2.	Online delivery of TVET and STEM	3.65	0.67	Strongly Agreed
3.	Lower learning in the TVET and STEM	2.65	0.57	Agreed
4.	Lower knowledge of TVET and STEM	2.75	0.58	Agreed
5.	Work-based learning affected	2.57	0.56	Agreed
6.	less self-confidence on TVET and STEM	2.50	0.55	Agreed
7.	Apprenticeship training and internships closed	3.80	0.83	Strongly Agreed
8.	Reduced skill towards TVET and STEM	2.57	0.56	Agreed
	Total	**2.98**	**0.78**	**Agreed**

Table 2: shows that items 1, 2 and 7 mean ratings with a corresponding standard deviation ranging from 3.65 - 3.80 and 0.67 - 0.83 which is high is indicating that The impact of the Covid-19 pandemic in delivery of TVET and STEM is strongly agreed upon, while items 3, 4, 5, 6 and 8 mean ratings with a corresponding standard deviation ranging from 2.75 - 2.50 and 0.58 - 0.55 which is also high and within the acceptable mean rating indicate that The Impact of the Covid-19 pandemic in delivery of TVET and STEM is agreed in tertiary institution in North-Central State of Nigeria.

Table 3: Mean ratings and Standard Deviation in the Responses of the Respondents on the Identified Strategies for Content Delivery of TVET and STEM in their Respective Tertiary Institutions

S/N	Items	$\bar{X}$	SD	Decision
1.	Further trainings in TVET and STEM	2.85	0.68	Strongly Agreed
2.	Professional development in TVET and STEM	3.78	0.67	Strongly Agreed
3.	Learning management system	3.54	0.77	Strongly Agreed
4.	Increased learning platforms for TVET and STEM	3.88	0.75	Strongly Agreed
5.	Partnerships and financing TVET and STEM	2.75	0.56	Agreed
6.	Content delivery via digital platforms	3.90	0.76	Strongly Agreed
7.	Support instructors and learners of TVET and STEM	3.68	0.66	Strongly Agreed
8.	Resources and support for TVET and STEM	3.87	0.68	Strongly Agreed
9.	Increase in online presence of TVET and STEM	3.87	0.68	Strongly Agreed
10.	Provision ICT learning facilities	2.75	0.58	Agreed
11.	Leading TVET and STEM to an enriching fulfillment	3.67	0.64	Strongly Agreed
	Total	**3.50**	**0.67**	**Strongly Agreed**

Table 3 shows that items 2, 3, 4, 6, 7, 8, 9 and 10 totaling 8 items whose mean ratings with a corresponding standard deviation ranging from 3.90 - 3.54 and 0.67 - 0.83 which is high is indicating that the rates at which lecturers/instructors strongly agreed on the identify solutions to delivery of TVET and STEM in tertiary institutions in North-Central, Nigeria. While items 1, 5, and 28 numbering 3 items whose mean ratings with a corresponding standard deviation ranging from 2.88 - 2.75 and 0.68 - 0.58 which is also high and within the acceptable mean rating indicate that the rates at which lecturers/instructors agreed on the identify solutions to delivery of TVET and STEM in tertiary institutions in North-Central, Nigeria.

. **Table 4: t-test Analysis on the Difference between the Mean Responses of the Respondents on their Role in Content Delivery of TVET and STEM in their Tertiary Institutions**

Respondents	N	$\bar{X}$	SD	Df	α	t-cal	t-tab	Decision
Lecturers	55	2.62	0.73					
				83	0.05	1.07	1.69	Not Significant
Instructors	30	2.51	0.64					

Table 4 shows the test of hypothesis one using the mean of lecturers/instructors on the role of Delivery of TVET and STEM where t-cal is 1.07 and t-crit is 1.69 at 0.05 level of significance with df 83. The result shows that t-calc is < t-tab. This indicates that there is no significant difference in mean response of lecturers and instructors on the role of Delivery of TVET and STEM Therefore, the null hypothesis of no significant difference between the mean response of lecturers and instructor on the role of Delivery of TVET and STEM was upheld.

. **Table 5: t-test Analysis on the Difference between the Mean Responses of the Respondents on the Impact of the Covid-19 Pandemic on Content Delivery of TVET and STEM in their Tertiary Institutions**

Respondents	N	$\bar{X}$	SD	Df	α	t-cal	t-tab	Decision
Lecturers	55	3.50	0.67					
				83	0.05	2.05	1.71	Not Significant
Instructors	30	3.32	0.63					

Table 5 shows the t-test of TVET lecturers/instructor on the impact of the Covid-19 pandemic on delivery of TVET and STEM where t-cal is 2.05 and t-tab is 1.71 at 0.05 level of significance with df =83. The result shows that t-cal is < t-tab. The result indicate that there is no significant difference in mean response of TVET lecturers/instructor on the impact of the Covid-19 pandemic on dDelivery of TVET and STEM. Therefore, the null hypothesis of no significant difference between the mean response lecturers/instructor on the impact of the Covid-19 pandemic on delivery of TVET and STEM was accepted.

Findings and discussion

Table 1 the research work revealed that role of TVET lecturers/instructors for Delivery of TVET and STEM in tertiary institution in North-Central Nigeria which is based on the social, technological and economic needs of a society; the knowledge acquired in formal education is not enough to sustain theDelivery of TVET and STEM. Therefore the roles TVET lecturers/instructor plays identifiy role TVET lecturers/instructors for Delivery of TVET and STEM. It points out and emphasized on 10 items as the roles TVET lecturers/instructors.

Table 2 the outcome of research study revealed that TVET lecturers/instructors Impact of the Covid-19 Pandemic in Delivery of TVET and STEM. TVET/Instructors identified and point out 8 items as they Impact of the Covid-19 Pandemic in Delivery of TVET and STEM in tertiary institutions in the North-Central state of Nigeria. They strongly agreed with most of the items.

Conclusion

The study examined the impact of the Covid-19 pandemic on content delivery of TVET and STEM in tertiary institutions in North-Central Nigeria. It uncovered the weak resilience of TVET and STEM institutions which include poor funding, inadequate and dilapidating infrastructure, inadequate teaching facilities, poor teachers' welfare, poor research funding, poor quality of teachers, conducive learning environment, and the like. The the role of TVET lecturers and instructor Delivery were identified. TVET is usually presented through hands-on and relevant real-world learning experiences. The impact of the Covid-19 Pandemic in Delivery of TVET and STEM were identified while solutions to deliver learning content of TVET and STEM in tertiary institutions in North-Central, Nigeria.

Recommendations

1. TVET and STEM should be given special attention on skills development as other educational programms counter the impact of Covid 19.
2. TVET lecturers/instructor should lay more emphasis on online delivery of TVET and STEM for skills development to counter the impact of Covid 19.
3. The identified solutions to deliver learning content of TVET and STEM should be given more priority by TVET lecturers/instructor to counter the impact of Covid 19.

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COVID-19 PANDEMIC: A NECESSITY FOR VIRTUAL LEARNING IN NIGERIAN HIGHER EDUCATION INSTITUTIONS

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Abstract: *This paper discusses on the COVID-19 pandemic: A necessity for virtual learning in Nigerian higher education institutions. The paper discussed on the concept of COVID-19 pandemic, virtual learning, types of virtual learning, advantages and this advantages of virtual learning as well as Solutions for virtual learning problems in Nigeria. The paper concluded that the emergence of covid-19 in Nigeria necessitates the use of virtual learning so as to fill the gap between the teacher or instructor and the students in learning especially during the period of the covid-19 pandemic. Finally, The paper recommended among others that additional class of computer literacy for both teachers and students should be placed. Besides, many digital tool providers offer customer support as well as a large learning base to their users to get armed with tutorials. Similarly, Students with special needs can be provided with the lesson script, typically made by teachers as supportive material for each lesson. Video transcription is another way to reach out to the deaf or hard of hearing students, automating the process by using voice-to-text applications. Another idea is to choose the motion-picture based material for the lessons, which will keep all students more engaged.*

Keywords*: Covid-19 Pandemic, Virtual Learning, Higher Education Institutions*

Introduction

The recent outbreak of the Coronavirus pandemic increased the gaps in the education sector globally. COVID-19 outbreak has created educational disruptions, and global health concerns that proved very difficult to manage by global health systems. Coronavirus pandemic has no boundaries, and the effect is large and fast. Just within few months of the outbreak of the disease, it has drastically changed the lifestyles of the entire world with billions of people being forced to 'stay at home', 'observe self isolations', and work and learn from home. It has limited the freedom of people to move, trade or associate. Not only has COVID-19 caused a total lockdowns in many countries across the world, but it also caused the death of thousands of people (Edeh, *et al.,* 2020).

The outbreak of COVID-19 affected all aspects of human activities globally ranging from education, research, sports, entertainment, transportation, worship, social gathering/interactions, economy, businesses, and politics. Indeed, the entire world was in distress as a result of COVID-19 threats, the reality of the situation was challenging to bear, and the education sector remains one of the worst-hit by Coronavirus outbreak. This necessitate the for changing of traditional teaching and learning approach to virtual learning (Edeh, *et al.,* 2020).

Virtual learning generally refers to instruction in a learning environment where teacher and student are separated by time or space, or both. The course contents are conveyed through Information Technology applications, multimedia resources, the Internet, videoconferencing, etc. (Doan 2020). Virtual learning has grown rapidly and globally in the past few years with diversified online courses at all levels including colleges, universities and lifelong learning institutions. Virtual education starts its life as an innovation to provide education access beyond the campus walls. The first online provision dates back to 1960, when the University of Illinois created an Intranet for its students. It is the system of linked computer terminals where students could access course materials as well as listen to recorded lectures (Blanson, *et al.,*2020).

The increasing use of technology in education has modified teachers' methods from the traditional approach that often place them as dispensers of knowledge to a more flexible approach where they serve as facilitators, mentors and motivators to inspire students to participate and learn (Onyema & Deborah, 2019). The use of appropriate educational technologies increases accessibility to learning resources such as Massive Open Online Courses (MOOCs), and multiple learning approaches to meet the need of diverse learners (Onyema, *et al.,*2019).

Overview of Coronavirus Disease

Coronavirus Disease is a contagious disease that first emerged in Wuhan, China in 2019. It was later coded "COVID-19" by the World Health Organization (WHO) which stands for Coronavirus Disease 2019. The Coronavirus outbreak remains one of the worst global pandemics for decades. The mortality rate soared and the easy of spread was upsetting (Edeh, *et al.,* 2020). Expert reports show that older people and those with underlying medical problems like cardiovascular diseases, diabetes, chronic respiratory disease, and cancer were more likely to develop serious illnesses from coronavirus, manifesting key symptoms of sore throat, running nose, constant coughing/sneezing, breathing difficulty and fatigue (World Health Organization, 2020).

School closures carry high social, educational and economic costs, and the disruptions they cause touch people across communities, but their impact is particularly severe for disadvantaged persons and their families. According to the United Nations Educational, Scientific and Cultural Organization (2020) monitoring, over 100 countries implemented nationwide closures, impacting over half of the world's student population. In Nigeria, the federal government ordered a total close down of all schools. The decision was largely applauded, and the National University Commission (NUC), a regulatory body for all universities in Nigeria also gave a follow-up directive to all universities in the country to shutdown. The government also suspended social gatherings, and workers were asked to work from home (Edeh, *et al.,* 2020).

Virtual learning

Virtual learning generally refers to instruction in a learning environment where teacher and student are separated by time or space, or both. The course contents are conveyed through IT applications, multimedia resources, the Internet, videoconferencing, etc. (Doan, 2020). Many educators predicted that technology ecosystems have gradually overturned the world of higher education globally as massive open online courses (MOOCs) can even replace the face-to-face university education and require a new field of educational psychology (Cambridge 2010, Slimp & Bartels, 2019, Govindarajan, &, Srivastava, 2020).

Types of virtual courses

There are typically three types of virtual courses depending on the nature of instructional interaction between the teacher and learner, particularly the point of time of occurring interaction. These may take the form of one or a smart combination of some of the followings::

1. ***Asynchronous Online Courses*:** Asynchronous online courses do not take place in real-time. Students are more self-directed, doing the course work and assignments within a time frame. The teacher-student interaction takes place through discussion boards, blogs, and email, etc. There is no appointed class meeting time. Asynchronous are flexible and effective to students with time constraint or busy schedules.

2. ***Synchronous Online Courses*:** Synchronous online courses require the instructor and student to interact online simultaneously. Students receive instruction from teacher and interact with their teacher and course mates through texts, audio chats, and video chats in a virtual classroom. Synchronous learning environments enable students to participate in a course from home in real time.
3. ***Hybrid Online Courses*:** Hybrid online courses, alternatively blended courses, facilitate both in-person and online interaction. Hybrid courses require meeting in-person during a semester and provide for computer-based communication in between those face-to-face sessions. It therefore can be both asynchronous and synchronous, and face-to-face interaction.

Advantages of virtual learning

According to Doan (2020), the following constitute the advantages of virtual learning:

1. ***Accessibility of Time and Place*:** Another advantage of online education is that it allows students to attend classes from any location of their choice. It also allows schools to reach out to a more extensive network of students, instead of being restricted by geographical boundaries. Additionally, online lectures can be recorded, archived, and shared for future reference. This allows students to access the learning material at a time of their comfort. Thus, online learning offers students the accessibility of time and place in education.
2. ***Affordability*:** Another advantage of online learning is reduced financial costs. Online education is far more affordable as compared to physical learning. This is because online learning eliminates the cost points of student transportation, student meals, and most importantly, real estate. Additionally, all the course or study materials are available online, thus creating a paperless learning environment which is more affordable, while also being beneficial to the environment.
3. ***Suits a Variety of Learning Styles*:** Every student has a different learning journey and a different learning style. Some students are visual learners, while some students prefer to learn through audio. Similarly, some students thrive in the classroom, and other students are solo learners who get distracted by large groups. The online learning system, with its range of options and resources, can be personalized in many ways. It is the best way to create a perfect learning environment suited to the needs of each student.
4. ***Expanded World View*:** Kids who learn in virtual classrooms will often get to meet and learn with children from all over the world and from different cultures and backgrounds. Insights into how other cultures and people approach problem solving can help children to better their own skills.
5. ***Improved Technical Skills*:** By virtue of being on a computer during the virtual lessons, kids can learn new tech skills and become more proficient with the keyboard and applications. Also, with more businesses now shifting to virtual teams, having the knowledge of how to collaborate and learn remotely can be a definite plus in a future career.
6. ***Immediate Feedback on* Learning:** Most online learning classrooms provide the opportunity for immediate feedback as opposed to traditional classrooms where teachers take the work home to mark it. This can accelerate a child's learning, letting them progress a lot quicker than they might do in their school or college.

Disadvantages of virtual learning

According to Doan (2020), the following constitute the disadvantages of virtual learning:

1. ***Inability to Focus On Screens***: For many users, one of the biggest challenges of online learning is the struggle with focusing on the screen for long periods of time. With online learning, there is also a greater chance for students to be easily distracted by social media or other sites.
2. ***Sense of Isolation***: Students can learn a lot from being in the company of their peers. However, in an online class, there are minimal physical interactions between students and teachers. This often results in a sense of isolation for the students.
3. ***Teacher Training***: Online learning requires teachers to have a basic understanding of using digital forms of learning. However, this is not the case always. Very often, teachers have a very basic understanding of technology. Sometimes, they don't even have the necessary resources and tools to conducts online classes.
4. ***Gadgets Shortage and Crashing Systems***: Not every student & teacher has a personal gadget to use for online learning. Many of them are supposed to share the laptops and computers with their parents, sisters/ brothers to stay on track. Another problem everyone's faced is a computer crash that usually happens at the most unexpected moment.
5. ***Connectivity***: Millions of people around the world experience technical difficulties due to high usage rate of online learning systems, video streaming software, and other digital tools. The platforms are overloaded: poor quality video and audio, internet problems. Internet connection is either unstable or the current data plan is not enough to cover the progressive e-learning needs. Students in both urban and rural areas are struggling with the "homework gap". Teachers are trying to manage the bad internet connection during the online lessons.
6. **Computer Literacy**: It is hard for teachers, students, and parents to start using a learning management system or any other digital tool out of nowhere without additional training. They could be overwhelmed by the amount of data they deal with trying to go digital, as well as frustrated facing the unknown.
7. ***Very hard for deaf or hard of hearing students***: The deaf and hard of hearing students were taken from their offline classes with interpreters and put home with poor ability to adjust the remote learning to their needs as well as amplify these adjustments. Provided that online learning is already a kind of challenge for the students, those deaf or hard of hearing facing a double problem multiplying the chances of falling behind.
8. ***Data Privacy***: From the very beginning of school shutdown, teachers and students have been connected using multiple digital tools without paying due attention to the amount and nature of the personal data they collect. For quick transition to online learning, we had to neglect our privacy, especially when large e-learning software suppliers offer temporary free subscription plans. The recent case of Zoom, a remote conference services company that has appeared to store all video conference recordings on storage space without a password, proves that we have to thoughtfully approach choosing the digital tools for online learning delivery.
9. ***Cyber Attack*:** The covid-19 outbreak, as well as any other crisis, is a fertile ground for cyber criminals, unleashing the wave of cyber attacks. Keeping the sensitive data from being stolen is a number one priority for digital tools that help deliver e-learning.

Recommendations/solutions to virtual learning problems in Nigeria

1. **S**tudents should develop confidence to embarrass the utilization and promote competency in virtual learning.
2. Teachers should keep their online classes crisp, engaging, and interactive to help students stay focused on the lesson.
3. Schools should invest in training teachers with the latest technology updates so that they can conduct their online classes seamlessly.
4. Unfortunately, little can be done to resolve the connectivity problem when everyone goes online. Calling your friends or groups admins and seeking advice can work out in some cases, as well as upgrading your current Internet plan to 4G or hoping for 5G coverage.
5. An additional class of computer literacy for both teachers and students should be placed. Besides, many digital tool providers offer customer support as well as a large learning base to their users to get armed with tutorials.
6. Students with special needs can be provided with the lesson script, typically made by teachers as supportive material for each lesson. Video transcription is another way to reach out to the deaf or hard of hearing students, automating the process by using voice-to-text applications. Another idea is to choose the motion-picture based material for the lessons, which will keep all students more engaged.
7. Starting to use an application, we can't be 100% sure our data will be kept safe. However, it's still within our power to be careful about the data we disclose on the Internet. Therefore, Getting into a partnership between schools and companies is by signing a contract with a clear explanation concerning the data they collect & use so as to enhance data privacy.

Conclusion

In conclusion, this paper revealed that the emergence of covid-19 in Nigeria particularly necessitates the use of virtual learning so as to fill the gap between the teacher or instructor and the students in learning especially during the period of the covid-19 pandemic. It's fortunate that considering the digital age of 21st century, virtual leaning comes to stay henceforth. Therefore, its fundamental for institutions to establish self-sustaining Internet and computer training, which will eventually allow universities to keep pace with developed countries and give them access to technological and academic information, as well as Internet training at various levels. The benefits they gain will thus affect every aspect of their academic, personal and professional life.

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