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Challenges affecting the teaching and learning of automotive engineering lesson online: a case study of private technical colleges in gaborone, botswana.

Faith Ngandu, Gaborone University College of Law & Professional Studies, Botswana, Prince Makokoro, National University of Science and Technology, Bulawayo, Zimbabwe
Jerald Hondonga (PhD), New Era College, Gaborone, Botswana

Abstract

Automotive engineering is a learning field which is hands-on and requires repetitive practice by learners to gain the necessary technical skills and competencies. Engineering education require a careful balance of classroom lessons, laboratory demonstrations and practice. Since the novel Covid-19 pandemic necessitated most teaching to be done online, this study investigated some of the challenges faced by private technical colleges to deliver automotive engineering lessons online. A qualitative approach was used to collect and analyse data, where interviews were conducted with thirty students, fourteen lecturers and six administrators. Results revealed that private institutions used different online platforms for lessons which included Moodle, Academia, and Google class. Findings suggested that lecturers lacked the technical skills needed to use online platforms to effectively deliver and simulate practical lesson demonstrations. Other findings were that learners were not eager to learn online since they did not have adequate technological gadgets to use. Both lecturers and students indicated the challenges of unreliable internet reception and high data costs. The study recommended that recommendations were that institutions should find ways to subsidise internet bundles for students and capacitate lecturers' skills on using online platforms for lesson delivery to improve the effectiveness on teaching automotive engineering online.

Keywords: COVID-19, blended learning, competencies, learning Management systems, online learning

Introduction and Background

The goal of vocational education is to produce graduates who are both ready for work and adaptable to change. The cognitive, emotional, and psychomotor elements of students' work abilities must be taught through learning. Skills training can be enhanced if students are properly engaged in all the three psychological elements (Sudira 2017). The advent of the novel Covid-19 pandemic necessitated most teaching to be done online; however, this mode has challenges in catering for the hands-on psychomotor skills. Although several teaching methods are used to deliver skills training, teaching automotive engineering online in Botswana, like in many other countries, is something new and facing some challenges. Pedagogical shifts and policy proposals to accommodate online teaching developments must use interactive media based on more efficient applications. However, the pedagogical developments must be tailored to specific learning skills. This study therefore, investigated the challenges faced by private technical colleges to deliver automotive engineering online.

Since vocational education in the automotive field consists of several complex competencies, the challenge is how to offer all engineering components online. Learning of automotive engineering drawing, workshop practicals and on the job training are some of the subjects in the automotive curriculum. The learning goal is to provide hands-on experience with developing and sketching measurable designs that may represent intentions and be easily understood by others (Furqon & Pramono 2017). The several competencies need to be taught online in a manner that students can

comprehend without being physically in classroom. Although media and learning resources for automotive engineering have been developed, ranging from e-modules, animation, and even real media, the extent to which private colleges in Botswana have gone to implement them was established by the study.

Although it was necessary to adopt blended learning strategies including the use of online teaching methodologies, the level and state of preparedness to combat the challenges related to the use of the online methods remained unresolved. In general, online learning methodologies had not been extensively adopted in the teaching and learning before the advent of the novel COVID 19 pandemic (UNESCO 2020). The implementation of e-learning systems in higher education institutions in underdeveloped nations has not been effective due to a variety of reasons, the most significant of which is a lack of infrastructure (Anderson 2008; Rana and Lal 2014), non- availability and under utilisation of digital technologies (Edinger, Reimer, and van der Viles 2013) and lack of appropriate ICT skills amongst lecturers and teachers (Tarus et al. 2015; Pani et al. 2015; Munezero et al. 2016). Cao et al. (2020) posit that broad-based online teaching has been difficult to implement in several countries due to lack of awareness and negative attitude towards ICTs by both students and lecturers. Teachers' professional and pedagogical skills are challenged by online learning (la Velle et al. 2020). To assist in the resolution of these issues, teachers must be innovative as learning facilitators and may need to retool to equip themselves with blended learning pedagogical skills needed for online lesson delivery (Rindu and Ariyanti 2017). The readiness of private institutions to utilise online teaching methodologies in Botswana needed to go through Botswana Qualifications Authority (BQA) quality assurance process.

Botswana Qualifications Authority (BQA) indicated that it was aware that some Education and Training Providers (ETPs) had introduced online teaching and learning platforms to deliver learning programs as a temporary measure for continued learning. However, BQA highlighted that ETPs would be required to implement mitigating strategies to assist learners who would not have benefited from the online learning environment (BQA 2020). The BQA stated that e-learning interventions that were not approved at the time of learning program accreditation were not considered official. As a result, ETPs were to adopt the online teaching model in terms of resources, policies, and other administration modalities in order to provide uncompromised quality services.

Students find it challenging to comprehend abstract explanations without being physically involved in the classroom and practical workshops (Sudira 2017). Although digital media and learning resources for automotive engineering have been developed, the extent to which private colleges in Botswana can afford and implement them were established by this study. If the situation is not improved, the graduates being taught through the online methodologies may miss some concepts which will remain a challenge in their effective delivery of their duties in the labour market.

The objectives of this study were to:

i) Investigate the challenges affecting challenges faced by private technical colleges and perception of learners on the delivery of automotive engineering online.
ii) Establish if the learners and teachers were able to use the online platforms effectively.
iii) Analyse the strategies that could be put in place by the school administration to overcome the challenges facing automotive engineering students.

THEORETICAL FRAMEWORK

Pragmatism was used to guide this study. Pragmatist philosophy is viewed as a practical action-oriented approach to finding solutions for existing problems. Pragmatism signifies practicality, compromise, prudence and a clear goal orientation in dealing with problems (Okafor, Onwuka, Osuji 2014). The pragmatic theory was adopted as a theoretical framework to explore how people learn through doing. Pragmatists hold the view that ideas are born out of activities, man is an active being hence, the greatest contribution of pragmatism to education.

Teaching of automotive engineering is based on the theory of pragmatism propounded by John Dewey, which emphasises on marrying of theory to practise (Okafor, Onwuka, Osuji 2014) define pragmatist philosophy as 'the philosophical idea that asserts that change is dynamic and belongs to the essence of reality.' According to Ross (2007) 'pragmatism is essentially a humanistic philosophy maintaining that human creates his own values in course of activity, that reality is still in making, and awaits its part of completion from the future.' Pragmatism, therefore, is the attitude of human mind which sees that reality is dynamic, in a continuous process of action, and considers only those things or principles as true which satisfy the needs, requirements, aspirations and goals of human beings by furthering the cause of mankind. Satisfaction of human needs is the bedrock of pragmatist philosophy.

Literature Review

Responsiveness to online teaching during the COVID 19 pandemic

Learning institutions are facing unprecedented changes to the teaching methodologies due the COVID 19 pandemic. Learning institutions had to transform from face-to-face to online teaching methodologies for teaching and learning to proceed (Tomas, López and Amsler 2021). The adoption of digital technologies and information and communication technologies (ICT), have become the lifeline to sustained education and training. The digital technologies which are already having an impact on our work and lives have become beneficial in the classroom as a source of fresh instructional resources (Chinengundu, Chakamba and Hondonga 2021).

In Botswana, learning was literally stopped at some point due to the novel COVID 19 pandemic. For instance, on the 30th of March, 2021, the Government of Botswana implemented a country-wide lockdown in response to the COVID19 health crisis. The lockdown was extended indefinitely. There was confusion on the way forward and Botswana spent the greater part of 2020 under lockdown with schools and colleges closed. There was need, therefore, to move away from using the usual face-to-face pedagogical methodologies and adopting innovative methodologies feasible using digital technologies. Due to the haste transitions which were not adequately planned for; institutions, lecturers and students alike, had a number of challenges to grapple with as they implemented new technologically based teaching and learning methodologies. Hence, this study particularly investigated the challenges of teaching and learning automotive engineering using online methodology.

Despite the different teaching methods introduced to mitigate the transmission of the disease in schools and colleges, it is acknowledged that the use of online teaching methods has not been easy in many countries due to the challenge of digital resources to support the new technologically based learning methodologies (Hondonga, Chinengundu & Maphosa 2021). The online platforms require instructors to interact with learners online (Silva et al. 2019). As a result, incorporating ICT education into all curricula has become a critical component to equip learners with digital skills, yet alone the teachers

also needed the digital skills for effective lessons delivery (Bahcivan, et al. 2019). Since the prolonged closure of colleges had no end in sight, the majority of schools had adopted online or blended learning as a teaching method. In the context of the COVID-19 pandemic, however, the move from face-to-face to blended learning proved difficult, and several challenges were identified (Ngubane, Blose, Mtembu, and Hlongwa 2020).

Online learning and teaching entails a wide range of tools, resources, educational techniques, roles, organizational arrangements, and modes of engagement, monitoring, and support with numerous substitution and integration possibilities (Bates and Poole 2003). The COVID-19 pandemic caught most Botswana tertiary education providers with no adequate systems to support an urgent transition to online learning (Botswana Qualifications Authority, [BQA] 2020). Higher education institutions had relied on the traditional face-to-face pedagogical approach as their principal mode of delivery since their inception. Where online systems were being developed, these were at infancy stage.

The main question is; what are the challenges affecting the teaching and learning of automotive engineering online in private colleges in Botswana? Despite a lack of readiness, institutions had little choice but to change from a traditional face-to-face to a blended learning method (World Bank 2020). There is evidence that demonstrates that, even before the COVID-19 epidemic, some institutions in Botswana had embraced the use of ICTs in the teaching and learning, however not predominantly online pedagogical methodologies (Kabanda 2014). The World Bank (2020) revealed that online teaching and learning methodologies have been used in other countries even before the pandemic.

Resources in private colleges

Online TVET delivery has had a fair share of challenges that affect its implementation. For example, a study by Hondonga, et al. (2021) in Botswana revealed that the majority of private colleges in the country were not fully ready to use online teaching methodologies despite that some of them had online platforms before the pandemic. The study findings further suggested that most students in private TVET colleges were not readily equipped with ICT skills to work alone from home during the pandemic. However, some students had basic digital tools like laptops but could not afford to buy internet bundles or access wired internet at home.

Elsewhere, a study by Kibata (2013) in Kenya's TVET institutions found that there were challenges of poor internet connectivity and some private institutions could not continuously afford the cost of internet. The same study also revealed lack of computer literacy amongst students and staff, inadequate resources and infrastructure to support e-learning initiatives. This demonstrated that institutions were not fully prepared to switch to online flexible blended education and learners could not benefit from the initiatives. Blended learning involves a lot of resources that should complement one another in the teaching and learning. Therefore, institutions need to invest heavily in digital learning resources (ILO 2020). Internet connectivity, a computer or laptop, a webcam, a headset, and printers are all required for online teaching and learning to be interactive (Bates 2015). Institutional ICT resources coupled with ICT skills for both teachers and students all play a significant role in a successful transition to e-learning (UNESCO 2020; Modesto and Tau 2006).

Methodology

The study employed the qualitative approach in collection and analysing data. The qualitative approach was concerned with the process of understanding and exploring the challenges of teaching and learning automotive engineering using online methodology (Mack 2010). The qualitative approach was used because the approach enabled the researcher to collect rich descriptive data in respect of implementation of teaching and learning automotive engineering online. A qualitative approach was used because the approach enabled the researcher to discover the reality from respondents. Direct interaction with

participants allowed the respondents to share their experiences, opinions and attitudes (Magwa and Magwa 2015).

The qualitative approach provided a more realistic feel of the world that cannot be experienced in numerical data analysis used in quantitative research. It provided flexible ways of collecting, analysing and interpreting data and the use of primary unstructured data gave qualitative research a descriptive capability. The research did not manipulate the phenomena of interest, it unfolded naturally. The direct involvement of the researcher with the respondents allowed for in-depth understanding of human behaviour (Shava and Nkengbeza 2019). The approach allowed the researcher to observe and explain the pragmatic situation being experienced.

Data collection

Interviews were conducted to gather information from the Principals, Administrators and lecturers for methodological and respondent triangulation. First-hand data was collected through the face-to-face interviews. Haper in Giddens (2009) assert that an interview is a two-way conversation initiated by the interviewer for the specific purpose of obtaining relevant research information and focused by him or her specified by the researcher's objective. Best (2004) purports that, people are more easily engaged in an interview than completing a questionnaire. Interviews allowed the researcher to probe respondents to freely express their perceptions on the challenges of teaching and learning automotive engineering online. An interview protocol was constructed and reviewed, pilot testing was done with few people who were not to be part of final sample selected for participation with a view to identify and correct any anomalies that would surface. The interview guide was prepared ahead of time with a list of themes and questions to be covered to allow a smooth flow of questioning and recording during the interview. The guide helped the interviewer to come back to the interview flow even after digressing when probing some questions for clarification. The purpose of the interview was explained first to seek consent and rapport with the interviewee and to get accurate data.

Results and discussion

Results were presented under each research question followed by some analysis of the results and a summary of the major findings of each question.

Main research question:

What are the main challenges affecting the online teaching and learning of automotive engineering?

Responses from lecturers and management:

The question sought to find out the challenges being faced by private institutions in the teaching and learning of automotive engineering. The findings indicated that practical lessons were a challenge to teach online because of the poor internet network reception, lecturers failing to simulate practical lessons online, and lack of technical capacity to use online platforms to deliver practical skills. To help in answering the main question, four follow up questions were asked.

(i) Do you have any technical challenges with online tools?

Data collected revealed that, indeed, the lecturers had some problems in navigating the use of online tools especially when teaching practical modules that need specific softwares.

ii) Does online teaching have an impact continuity of teaching and learning in the college?

Responses from the college lecturers suggested that most private colleges heeded the call to conduct lectures online and this allowed for continuity in teaching and learning. For example, the following responses were said my some respondents:

Respondent 2: 'Yes, because of continued lockdown, online teaching is very important because learning can continue."

Respondent 19: 'To a certain extent, however practical lessons still need face-to-face and laboratory demonstrations'.

Respondent 20: 'Yes it does, it has enabled the organisation to implement blended learning, enabling students to have an easier access to learning."

(iii) What challenges did the college face on assessment of students online?

Most responses suggested that indeed, there were lots of challenges in conducting the online lessons as reflected by the following responses:

Respondent 18: "Poor internet network, students not attending lessons and high cost of internet data".

Respondent 20: "The main challenges include academic dishonesty, lack of commitment by students to submit assessments".

Respondent 17: "Students do not have access to internet, and if it is there, the network will be slow".

Responses from students:

Are you motivated to learn online?

The question was meant to understand the level of interest of learners when they learn online. According to the results gathered, inferences can be made that although learners were motivated to learn online, they felt isolated by the fact that they cannot physically see and learning from their lecturers as well as their classmates.

SRQ1: How do learners perceive the teaching and learning of automotive engineering online?

Responses from lecturers and management

According to the responses, to a lesser extent, the learners had the necessary basic skills and were willing to learn online. To further understand how the learners perceived the online teaching and learning, the question was further broken down into five further questions, and the responses are presented:

(i) Do learners have the necessary skills in accessing the internet?

The majority of respondents indicated that learners have the basic necessary ICT skills to learn online. This suggested that students were taught ICT skills before the transition from face-to- face lessons to online lessons delivery. The results further suggest that ICT skills were not a limiting factor to learning online

(ii) Do you think it is a good idea to use online learning?

Most responses indicated that it is a good idea to learn online only if there are enough resources to support the methodology put in place. For instance, the following were some of the responses:

Respondent 4: "In this era, yes, it is good to learn online, but a lot has to be done to facilitate the practical aspect"

Respondent 8: "Yes, online lessons are good or theory but practicals will require reliable resources".

Respondent 10: 'It is a good idea to learn online, especially under the pandemic era for learning to continue'.

(iii) Is teaching online an effective method for the delivery of automotive engineering courses?

The above question attracted mixed feelings from the respondents. For example, the following was said:

Respondent 12: "It is a good method provided every student and lecturer has internet facilities".

Respondent 14: "No, it needs more time and no exposure to actual motor components".

Respondent 16: "YES only for soft skills modules".

(iv) Do learners have adequate infrastructure and resources to facilitate online learning?

Responses showed that both learners and lecturers do not have adequate infrastructure and resources for online learning despite that they have the basic skills and are able to use the technological gadgets effectively. Students felt learning in automotive engineering should involve a lot of hands-on practice to be effective. According to Hondonga et al. (2021), the high cost of internet, and a lack of resources and infrastructure to enable eLearning are the biggest challenges to private institutions.

(V) Are learners motivated to learn online or they feel isolated?

Respondents indicated that learners feel bored and isolated. According to the information gathered, learners felt it was time consuming learning online because students spent more time on computers without learning practically, and there was no physical interaction between them and lecturers.

SRQ3 (i) What strategies could be put in place by the colleges to overcome the challenges of online learning by students pursuing automotive engineering?

 Responses from lecturers and management

The question sought to find out the mitigation measures that could be put in place by institutions to fully implement teaching and learning online. The question was further broken down into four parts.

(i) Is there any clear communication between learners and lecturers?

Most respondents agreed that there is clear communication between learners and lecturers through emails and WhatsApp.

(ii) How do colleges communicate and send assignments to students?

According to the data collected, respondents said the colleges were, indeed, communicating using emails and assignments were sent through the learning platforms like Moodle.

(iii) Are the expectations of the lecturers set out clearly?

Responses indicated that all learning materials send and posted on the learning platforms had the same format starting with the topic and objectives for each lesson to guide students during their individual studies.

(iv) Is the lecturer able to build a strong classroom community [use of video chats, class message boards]?

The response was *YES.*

Responses from students

How do you overcome challenges, for instance when you need help?

The responses from learners indicated that whenever they had challenges, they sought help from the lecturers. Students further suggested that challenges of teaching and learning online can be overcome if institutions, as a collective, approach the internet service providers to avail internet at reduced cost to enable learners to access uninterrupted internet connection even from their homes.

Conclusions

Findings suggested that teaching engineering courses online is a challenge because of the unreliable internet reception, unaffordable data bundles, lecturers failing to simulate practical lessons online or lack of technical capacity to use online platforms to deliver practical skills. Despite the challenges from the research findings, the researcher opines that resources can be gradually put in place as institutions accept to invest more on resources needed for the blended learning necessitated by the COVID 19 pandemic. The same sentiments were postulated by Hondonga, et al, (2021) that, private institutions in Botswana embraced use of ICTs in teaching and learning even before the pandemic and this is a good indication of their willingness to continue improving the innovation in lesson delivery. The challenge is that teaching engineering courses require demonstrations, simulations and students have to observe and practice what they have learnt. Findings also indicated that learners are not eager to learn online since they do not have adequate infrastructure and resources despite that the learners have the basic skills and are able to use the technological gadgets effectively.

The biggest concerns emerging from both students and lecturers responding to the interviews were: lack of access to the internet and/or a computer or laptop, and lack of instruction in using their college's LMS. Furthermore, many students are averse to switching from traditional to online learning techniques. As noted by Chinengundu et al (2021), continuous persuasion and acceptance to changes that have come with the Fourth Industrial Revolution (4IR) technologies which are already having an impact on our work and lives can be beneficial in the classroom as a source of fresh instructional resources, and the changes can be institutionalised overtime. The institutions tried by all means to fully implement online learning although there were challenges. Lecturers also tried by all means to help learners in every possible way.

Prior to the COVID-19 epidemic, lecturers indicated their college had online teaching platforms and LMS in place, and the majority of lecturers asked said they had been trained in the use of the LMS. Despite this, they all felt that students needed more instruction in how to use the LMS. Most instructors believed that online platforms can be effectively used to teach TVET courses and that online techniques can be effective for distributing TVET teaching materials, just like the students who responded to the poll. On one hand the researcher argues that a movement towards a more democratic and inclusive process of learning, which empowers teachers should be encouraged in the 21st century and this can be achieved by capacitating TVET instructors with much needed skills to deliver both theoretical and practicals lessons online. On the other hand, enhanced training on using online platforms can be intensified towards students since most students' responses agreed that they had not used their college's LMS much before the lockdown and that, due to a lack of internet connectivity and/or access to a computer or laptop, they resorted to utilizing Whatsapp to interact with their lecturers. The requirement for teachers and schools to be flexible, adaptive, and agile to unforeseen events has come out clearly

from the findings hence, transition to a more emancipatory underpinning philosophy of teacher education, capable of confronting the pedagogy of the current technical paradigm is required.

Recommendations

The first objective investigated the challenges affecting the delivery online automotive engineering courses and learners' perceptions on the teaching and learning of the courses. The study found that learners are not eager to learn online since they do not have adequate infrastructure and resources despite that the learners have the basic skills and are able to use the technological gadgets effectively. Based on the findings, recommendations are that:

- Learners should be trained on using LMS and institutions should forge for partnership with internet providers for more affordable data options to improve the participation of both lecturers and learners using online learning platforms.
- Both parents and institutions must find affordable means to equip learners with the necessary digital equipment for online lessons.

The second objective sought to establish if the learners and teachers were able to use the online platforms effectively. The study found that on one hand, lecturers were failing to simulate practical lessons online due to the lack of technical skills to use online platforms effectively to deliver practical lessons. Based on the findings, recommendations are that:

- Students should be educated on how to use their LMS and the advantages of online and blended learning.
- Lecturers must also be trained to be able to use simulations effectively on the learning platforms they are using for practical lessons.

The third objective investigated if there are any strategies that could be put in place by the college administrations to overcome the challenges facing the teaching and learning of automotive engineering students using online methodologies. The study found out that strategies were indeed put in place by the institutions but the lack of human technical skills was a challenge as well as inadequacy of digital technologies and equipment for both teachers and students were a challenge. Based on the findings, recommendations are that:

- There is need to improve internet access to private institutions so that students can opt to come and access internet for their lessons using their computers/laptops.

The fourth objective investigated to ascertain if private institutions had online teaching platforms for the automotive engineering courses. The study found that institutions have platforms which included Moodle, Academia, and Google class. Based on the findings, recommendations are that:

- Private institutions should comply with Botswana Qualifications Authority (BQA) recommendations for e-learning by improving their ICT infrastructure and resources, and to ensure that lecturers are fully capacitated to for online lessons delivery.

The private colleges, through their association, must lobby internet providers to subsidies for reduced students data costs for all students to enroll for lessons.

The study also opens avenues for further research in the best pedagogical technologies for online teaching of automotive engineering based on the gaps established by the study.The findings helped to recommend strategies for adequate investment into ICT infrastructure with the understanding that e-learning is the inevitable future of learning.

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Basic Fire Safety- Fire Prevention and Firefighting

Brigadier General Mohammad Ayub Ansary, psc (Retd)

Abstract

Fire is a product of chemical reaction of air (oxygen), heat (temperature) and fuel (combustibles). Limited to make sharp objects and burning wild meat in the primitive era, use of fire is now multipurpose and indispensable. Domestic functions, office work and industrial productions- all use fire. Fire is an entity somewhat like Life and Death. Controlled fire is an advantage, a driving force to the advancement of civilization. But the uncontrolled use or accidental fire is a devastation. Sources of fire are numerous. Consequently, fire hazards are also uncountable. Fire is a two-pronged utility that demands conscious use. Accidental fire, if not extinguished promptly, engulf surroundings quickly resulting disastrous consequences. Use of fire cannot be avoided absolutely. Only way to live with it is to prevent occurrences by taking all out measures and fight it instantly. Firefighting (FF) involves 3- lines: 1) 1st line FF is done by the persons who see an unwanted fire using hand-held extinguishers. 2) 2nd line FF uses in-built system like sprinkler and hydrants and 3) 3rd line FF calls for using national resources. ABCE Dry Powder and CO2 are the most common fire extinguishers used worldwide. Identifying type of fire and selecting suitable extinguishers is important. Training is a must to understand Fire Safety and fight a fire without infliction casualy. FF is an individual's responsibility at any time anywhere. Governments have the obligation to devise suitable mechanism to impart universal training to all people.

Overview

Cases of accidental fires are incessantly on the rise across the country and in the globe. Fire incidents are more in cities and industries than rural areas. Advanced living entails use of extra power in residential and commercial buildings. Modern industries use lots of combustible materials and various forms of energy in their manufacturing process. Rapid urbanization, industrial expansion and rural electrification including progression in the transportation system resulted in the use of huge energy resources. These phenomena resulting numerous fire hazards at all walks of life.

Nimtali inferno of June 2010 originated due to electric transformer explosion, Tazreen Fashion blaze of November 2012 initiated seemingly due to exposed wires, Churihatta fire tragedy of Feb 2019, a chemical-fueled fire, FR Tower fire incident of Mar 2019 happened due to electrical short-circuit are few major fire incidents of recent past that killed hundreds and injured thousands beside property loss worth billion dollars. Unfortunately, firefighting efforts take further toll on the firefighters due to wrong approach in fighting a fire owing to inadequate or no knowledge on the sources of fire. BM Container Depot fire at Chattogram is a case in focus. Spraying water on the fire led to enormous explosion of Hydrogen Peroxide stored in the container that devasted the area at large. Similar was the case with Churihatta chemical fire where spraying water did not bring an end to fire rather it prolonged and was put out when all the chemicals were fully burnt off resulting disastrous outcome.

An assessment of the organizational development and individuals' capacity building in last 10- years in understanding basic fire safety, e.g., knowledge on fire prevention and skills on firefighting, the state of affair is not very encouraging. FR Tower is a 22-storied modern state of the art building having advanced fire safety arrangement in place. But the eye-witnesses revealed none of the tenants and the staff were seen tried to fight the fire with the appliances available in the building. People both visitors and dwellers were running omni directionally ignoring even Fire Escape Route hearing the sudden news

of outbreak. This unbecoming behavior is being observed repeatedly virtually in all fire incidents nationwide.

Most fires at the initiation, when a fire is small in size and intensity, are generally extinguishable with readily available CO2 Extinguisher and/ or by ABC Dry Powder separately or in combination. Trained people can fight a fire efficiently at the start provided early warning is operative. But very rarely fires are extinguished at the commencement due to lack of training and organizational initiatives in conducting real life exercise and demonstrations. Generally, security staffs of a facility and the fire crews form the nucleus of a firefighting force. People irrespective of rank and file must know primary firefighting should we really mean defeating a fire at the outbreak. Discussion on the topic is relevant to least developed and developing countries like Bangladesh. At this backdrop, this paper shall discuss the topic under the following main headings:

Fire Safety: Basic Understanding and Implication.

Effective Firefighting.

Fire Safety: Basic Understanding and Implication

Fire and Fire Triangle.   Fire is a chemical reaction uniting combustible materials or fuel, heat or temperature and oxygen or air producing heat, smoke or flame. If none of these are produced then there is no fire. For any kind of fire these are essentials that constitute a fire. Combustible materials exposed in extreme temperature produces a fire spontaneously. Oily rags left in the open on a hard and dry surface that receives direct sunlight results in an ignition. Wild fire across the globe is an example of automatic fire. On the contrary, extinguishing a fire implies that we are either reducing heat from a fire, stopping oxygen supply or removing fuel. Extinguishing a fire by spraying water means reducing heat, covering a fire with a quilt means stopping air and isolating a fire from other combustible materials around means confiscating fuel from the fire. Oxygen, fuel and heat are needed for a fire to occur. This is known as the fire triangle.
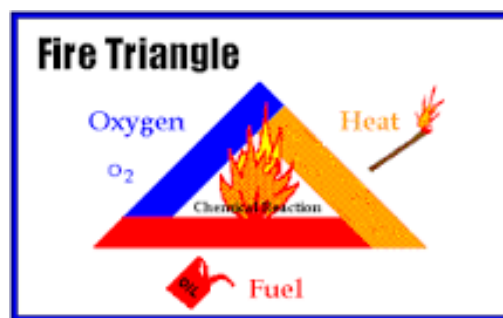
Historical Perspective. Fire and civilization are two inseparable entities. Fire is, perhaps, one of the first inventions of mankind in the primitive era known as Stone Age. Fire was first needed by the ancient people to make weaponry to protect themselves from the attack of ferocious animals and to burn the wild meat they used to eat. With the passage of time uses of fire has become versatile. In the modern age, no industrial production and domestic activities can be carried out without the use of fire. Living without fire is simply impossible.

Inevitability of the Use of Fire.   Fire is an essential element of civilization and its continuous development. Controlled fire is always an advantage to the users and the uncontrolled use or accidental fire is a devastation. Fire is life and death, a two-pronged utility, serving the inevitable need of human societies in domestic functions, office works, industrial productions and mobility on land, air and sea. Civilization will be at halt without the use of fire. In modern days, accidental fire at home, office and industries intensifies very quickly and often causes destruction as all these places have lots of hydrocarbon and its byproducts used in cooking, heating, painting, interior works, furniture, etc.

Fire Hazards. Sources of fire in residential and commercial buildings, government offices and factories are numerous. Domestic fire sources are commonly kitchen gas, cooking oil, electric short-circuit, air conditioners, freezers, TVs, computers/ laptops, mobile phones connected to electric sockets, heating devices like electric ovens, water heaters, lightings with interior works, playing with fire by children, casual smoking, etc. Together with these, fire sources are even more in manufacturing industries and marketplaces. All these fire sources present constant fire hazards either independently or collectively warranting a vigilance and duty of care always.

Fire Safety.   Fire safety denotes planning and structure designing aimed at reducing the risk of fire or impeding the spreading of a fire. It encompasses the use of fire-resistant building materials, preventative actions, safe work practices, fire safety training, flame-resistant protective clothing and the like. For the purpose of discussion in this paper we shall combine all the parameters of Fire Safety into two broad aspects namely Fire Prevention and Firefighting (FF). Fire Prevention includes everything devised to preventing outbreak of a fire. Taken all tangible measures of prevention, yet there will be cases of accidental fires demanding effective FF capability. FF is the action or process of extinguishing fires as a person's or individual's job.

Causes of Fire.   Causes of fire are uncountable. Most common causes of home fire are: cooking equipment or kitchen fire, heating equipment, candles (open light/ flame), electrical equipment and electronics, casual smoking, children playing with fire, poor electrical fittings, loose electric connection, electric short-circuit, gas and battery leakage, etc. Along with these, industrial fire involves chemicals, gas and wide-ranging highly volatile combustible materials. Act of God, e.g., lightning is also a cause of fire.

Fire Prevention.   Knowing the causes of fire, we must endeavor to stop possible outbreak of a fire by taking all-out measures both tangible and intangible. Tangible measures are the physical actions to address the causes and the intangibles are the awareness, training and alertness. Primary effort in preventing a fire is to identify the hazards in advance and address them holistically.

Fire Safety Regime. Fire Safety (FS) management is a very important subject. It's everybody's responsibly to ensure FS at respective arena. In developed countries and advanced societies, there are appropriate legislation, effective structures and suitable organizations to enforce an efficient FS environment. Every country, rich or poor, has a FS department at the national level with its lowest tire working at the grassroots. But most countries, especially the poor and the technologically disadvantaged ones lack training, equipment and required organization to ensure a workable FS administration. A FS regime is truly effective and really functional when an ordinary person can fight a fire outrightly with his elementary knowledge enabling him identifying a fire for applying the correct type of extinguisher to extinguish it without inflicting self-casualty.

Effective Firefighting

General.   FF is the work or attempt to control and extinguish a fire. Evaluating many past incidents of fire, it may be prudent to identify 3- lines of FF. 1st line FF of small fires at home or work, 2nd line FF of moderate fires at big buildings and 3rd line FF of large fires in industries. 1st line FF involves using hand held fire extinguishers. 2nd line FF uses in-built systems like water sprinkler, hydrant, etc. 3rd line FF calls for using national FF resources. 1st line FF is the elementary FF that is undertaken by anybody who has seen an accidental fire provided one knows the type of fire and the ways to fight it efficiently. 1st level FF is very important as its success eliminates the need for 2nd line and 3rd line FF. While FF level increases due to size and intensity of a fire, the role of 1st line firefighters never diminishes. As a matter of fact, every capable citizen must have 1st line FF knowledge that saves lives and property.

Requirement of 1st Line FF.   One must know the power source and the fire hazards at one's home or work and the means available to fight a fire. Knowing the type of fire instantly at the outbreak is pivotal to fight a fire safely. History is replete with examples where firefighters were killed due to wrong approach to FF. Twin Tower fire in NY is a real-life example of fatality on firefighters. Knowledge on FS Plan of a building, training on FF equipment, efficiency on basic FF and the promptness in calling/ using support of 2nd and 3rd line FF are the qualifications for 1st line FF.

Types of Fire. Fire is a name of cruel devastation. Experts have defined 5 main classes of fire: 1) **Class A:** solid materials such as wood or paper, fabric, and some plastics, 2) **Class B:** liquids or gas such as alcohol, ether, gasoline, or grease, 3) **Class C:** electrical failure from appliances, electronic equipment, and wiring, 4) **Class D:** metallic substances such as sodium, titanium, zirconium, or magnesium and 5) **Class K:** grease or oil fires specifically from cooking. This classification can be reduced to 4 basic types: 1) **Type A**: Solid Fire- fire of common solid materials, 2) **Type B**- Liquid Fire: oil, lubricants, grease, cooking oil, 3) **Type C**- gas, compressed air, vapor, steam and 4) **Type E**- electric fire. Most fires at the beginning are of one type until it is allowed to scatter. Massive fire at Beirut port due to explosion of the warehouses in 2020 resulted in an immense fire of composite nature is comprehensibly beyond the scope of 1st and 2nd line FF efforts. Nevertheless, sound knowledge on classes or types of fire is essential to fight them at the start obviating the need for colossal FF efforts.

Commonly Used Fire Extinguishers.   Lots of fire extinguishers are in the trade that works on the principle of heat reducer and/or air suppressor. Two most commonly used fire extinguishers, i.e., ABC, also known as ABCE Dry Powder, and CO2 are very effective against on all types of fire used separately or in combination. For ABC Dry Powder to be effective, the burning surface should allow settlement of powder on it to stop air supply. CO2 is very effective against electric fire and fire of raised or hanging objects where ABC Dry Powder is not effective. Predominantly, CO2 extinguishes any type of fire as it does not allow fire to exist or continue.

Identification and Use of Extinguishers.   Set aside many types of water and foam type extinguishers, ABC Dry Powder and CO2 extinguishers are the most common, effective and easy to handle. Correct identification of the extinguishers and their serviceability is very important for an effective FF. Reckless

use of fire extinguishers may cause serious fatality to the users. As such, familiarization with the equipment, their use and effectiveness should be tested before the people through real-life exercise and demonstrations. For using these two extinguishers one must know their characteristics and the operating procedures levelled in the cylinder body. It's interesting to learn PASS to use these extinguishers, where P indicates Pull the Pin, A denotes Aim the nozzle at the base of the fire, 1st S specifies Squeeze the liver and the last S means Sweep from side to side. See the pictures below for further understanding as to how these extinguishers look like and work.

ABCE Dry Powder Extinguisher   **Carbon Di-oxide Gas Cylinder**

Training.   FS is a genuine lifesaving skill. Training is a must to learn this skill. 1st level FF, if successful, excludes the need for 2nd line and 3rd line FF. Care should be given to ensure everybody know primary FF. Lots of courses and training materials are available in printed form and soft versions are plenty in the internet resources. Besides fire department, there are many expert organizations and individuals who can impart realistic training on FS. Corporate houses, residential communities, housing societies and industrial organizations should impart this training to all their people compulsorily from top to bottom. Government shall undertake nationwide plan to educate young people in the schools. All other people shall be trained under a special program in order to establish a vibrant FS environment nationwide.

Conclusion.

Bangladesh is a rapidly developing country and has been recognized as mid- income group country. Nearly, all parts of the country have been electrified except few remote areas of the southern coastal belt and some inaccessible parts of the hill districts. Nevertheless, most of these areas too are using wind turbine or solar panel electricity. Many countries of the world are in similar footing of development. As energy is the main constituent of manufacturing activities, the use of power across the globe have increased manifold. More energy inputs present additional fire hazards. Justifiably, we cannot stop use

of fire, which is an essential element of modern civilization, we must be able to reducing fire hazards and risks in order to save life and property and minimizing collateral damage in case of an outbreak of a fire.

To make people aware on FS requirements and proficient in 1st line FF, universal training is a demand of time. Governments shall enact legislation to make FS traning a compulsory qualification for all citizens. There should be standard curriculum on all 3- lines of FF in the educational institutions. It should be a equirement for seeking govt. and private job including going abroad for work. Informal FS traning should be imparted in the slums that experience repeated outbreak of fire. Rural people should also be trained by organizing mobile teams under fire department. Remember, attempting a FF ignorantly is a suicidal venture.

Employability Skills Needed by Electrical/Electronic Technologists for a Rewarding Career in Oil and Gas Industry in Niger-Delta, Nigeria

OWO, Offia Tugwell, *PhD,* Department of Technical Education,
Ignatius Ajuru University of Education, Nigeria

Abstract

The study assessed the employability skills needed by electrical/electronic technologists for a rewarding career in oil and gas industry in Niger-Delta, Nigeria. Descriptive survey design was used for the study whose population comprised 1404 oil and gas industry workers in Niger-Delta, Nigeria. Purposive sampling technique was used to select from the population, 27 electrical supervisors and 62 electrical graduates (technologists) as the study sample. One research question and one hypothesis tested at 0.05 level of significance guided the study. A 21-item questionnaire entitled "Employability Skills Questionnaire (ESQ)" was used to gather information from respondents. The instrument was face and content-validated by two industry-based electrical supervisors and another expert in educational measurement and evaluation. The instrument's reliability was established via Cronbach alpha method which yielded a coefficient of 0.83. Mean was used to answer the research question; standard deviation was used to ascertain homogeneity in the responses of the respondents and the hypothesis was tested at 0.05 level of significance using t-test. The finding of the study revealed among others that polytechnic graduates of electrical/electronics (technologists) need generic soft skills for a rewarding career in oil and gas industry in Niger-Delta, Nigeria. Consequently, it was recommended among others that the Federal Government of Nigeria through the National Board for Technical Education (NBTE) should ensure periodic review of polytechnic education curriculum to incorporate appropriate generic soft skills needed for a rewarding career in oil and gas industry in Nigeria.

Keywords: Career, employability, generic soft skills, oil and gas industry, technologist

Introduction

The petroleum industry also known as oil and gas came into existence due to the detection of petroleum by the shell group in Oloibiri, Bayelsa State in 1956. In Nigeria, the industry became very vibrant from inception and function on a well-defined organizational structure (Nigerian Oil & Gas Brief, 2014). Presently, the oil and gas industry contributes tremendously to the economic development of Nigeria than any other industries. The Nigerian oil and gas industrial operations yield much revenue to the Nigerian Government thereby served as the prime mover of the nation's economy (Chizoba, Gwen & Chike, 2012). An estimated value of about $600 billion was earned by the Nigerian government from oil and gas alone since its discovery in commercial quantity in 1956 (Atakpu, 2007). Oil and gas industry operations cannot be executed without using skilled electrical/electronics personnel.

Graduates of electrical/electronic engineering from polytechnics also known as technologists are those who received standard technical training in theories and practice of electrical engineering technology

and consequently, specialized in any one of the areas of electrical/electronic engineering. According to Owo and Isaac (2020), the electrical/electronic engineering graduates of Nigerian polytechnics are expected to acquire employability skills for sustainable career in the industry upon graduation. Therefore, fresh electrical graduates at the point of entry into oil and gas industry for a rewarding career, need additional training usually organized by the oil and gas industry to gain exposure about the skills demand and safety rules applicable within the work environment of the oil and gas industry in order to function effectively in their roles comprising designing of a complex electrical system for oil and gas facilities, carrying out electrical maintenance and operations on an oil and gas facility, executing electrical project engineering or site management roles available in a wide variety of locations. Most times, the training and development programmes organized for electrical/electronic entry level positions in the oil and gas sector are administered by experienced electrical personnel called electrical supervisors.

Electrical supervisors are electrical personnel who received educational training up to the Bachelor's degree or Advanced Diploma in electrical engineering or related fields with proven years of work experience in designing and implementing work schedules for the electrical staff of oil and gas industry, provision of technical assistance to young graduates, inspecting and assessing the level and quality of work executed by the electrical staff, reading and interpreting electrical design schematics to ensure proper installation of electrical systems, troubleshooting major system failures and equipment malfunctions, repairing and maintaining electrical equipment, overseeing the purchasing and maintenance of electrical equipment on-site, ensuring that electrical work is completed on schedule with appropriate code, maintaining a safe and clean work area, consulting with builders, architects and other professional workers on-site to ensure that quality work is being done through effective team work.

For electrical supervisors to function exceptionally, the development of generic soft skills such as strong interpersonal skills, leadership skills, communication skills, computer skills, attention to details, among others are indispensable. The acquisition of these skills guide against unemployment in the world of work.

Unemployment which could be seen as a situation whereby a portion of the nation's population who are willing and actively searching for job could not secure any describes a situation where employable individuals are actively seeking opportunities but are unable to find. Consequently, since competent technologists are needed in oil and gas industry, developing their employability skills therefore is very necessary in order to secure a rewarding career in oil and gas industry. Both transferable (generic) and core (technical) skills could be of great assistance to an employee and the employer. Thus, what makes a

difference in the industry most times is not academic qualifications but relevant skills possessed by the employee.

Skills are special talents and abilities developed by an individual to execute tasks in a unique and more impressive manner which are acquired through quality education, training and experience. According to Scholars International Institute of Technology (SIIT) (2021), skill enhances one's ability to effectively execute specific task towards the achievement of desired goals. In the words of Samuel (2017), skill is any special capabilities in a given occupation developed through learning and practice. In the same vein, Ogbuanya and Bakari (2014), posited that skill denotes capacity to adjust one's conduct, discernment and sensation indefinite contexts and within precise task domains to perform tasks exceptionally. Skills therefore denote special capacities, talents and aptitudes gained through committed learning, practice and experience which enhance one's proficiency in his or her work roles in any chosen occupational field. Skills can further be described as human capacities to perform any activity with agility and competence. Any skill sets capable of assisting someone to gain and maintain employment in any organization or industry can be regarded as employability skills.

Employability skills according to Dunne and Rowlins, (2000), are collections of expertise, awareness and traits that can enhance the chances of an individual to gaining, maintaining and excelling in an employment. Employability skills empower one to gain fresh hire; progress on different roles by excellent performance within the industry to obtain quick upgrade at work (Billing, 2003; Crebert, Bates, Bell, Patrick, & Cragnolini, 2004). Likewise, Hewitt (2005) saw employability skills as viable tools not only useful in securing paid employment, but also very necessary to achieving rapid career advancement. Employability skills refer to mutual mixture of personal qualities, expertise of several categories and understanding of the main subject (Knight & Yorke, 2002). Employability skills denote life skills encompassing generic and technical competencies such as achievements, knowledge and personal attributes which can enhance the chances of a job seeker to secure and maintain a job role and in the long run, become successful at work (Ju, Zhang & Pacha, 2012). Employability skills therefore entails a skill set comprising all the essential technical, generic soft skills and personal attributes vital not only for getting a job but also to maintain and become proficient at it so as to grow in a chosen career or organization. In essence, any graduate who lacks employability skills is not yet ready to obtain a job space in the world of work, especially in oil and gas industry (Rasul, Ismail, Ismail, Rajuddin & Abdu Rauf, 2010); Idris & Rajuddin, 2012). Pool and Sewell (2007) stated the employability model contains five components were measured as key employability categories and they include: Knowledge of the subject, appreciative and expertise, essential skills, sensitive acumen, learning for professional

development, job and lifetime experience. Also, generic soft skills which are non-technical skills necessary in the place of work for increase productivity are required for improved efficiency of employees at work. According to Sodipo (2014), employers equally search for expertise that reveal personal qualities, affirmative attitude, good work-ethics and readiness to learn, good personal presentation, honesty, integrity, reliability, time keeping and personal organization, collaboration, cooperation, flexibility, commercial awareness and customer focus, business etiquette, communication, numeracy, computer literacy skills among others. Fresh graduates' inability to acquire generic soft skills as observed by the researcher, necessitates this study entitled "Employability Skills needed by Electrical/Electronic Technologists for a rewarding Career in Oil and Gas Industry in Nigeria".

Purpose of the Study

This study assessed employability skills needed by technologists for a rewarding career in oil and gas industry in Nigeria. Specifically, the study was embarked upon to:

Determine the generic soft skills needed by electrical/electronic technologists for a rewarding career in oil and gas industry in Niger-Delta, Nigeria.

Research Question

What are the generic soft skills needed by electrical/electronic technologists for a rewarding career in oil and gas industry in Niger-Delta, Nigeria?

Hypothesis

There is no significant difference between the mean responses of electrical supervisors and graduates on generic soft skills needed by electrical/electronic technologists for a rewarding career in oil and gas industry in Niger-Delta, Nigeria.

Methodology

The research design adopted in this study was descriptive survey design. The study was conducted in the Niger-Delta region of Nigeria. The population of the study was made up of 1404 oil and gas industrial workers. Purposive sampling was used to obtain from the population, 89 electrical/electronic technologists consisting of (27 supervisors and 62 graduates) working in Green Energy International Ltd., AMNI and Total Production and Exploration companies. One research question and one hypothesis tested at 0.05 level of significance guided the study. A 21-item questionnaire entitled "Employability Skills Questionnaire (ESQ)" was used to gather information from respondents. The questionnaire was

designed on a 5-point Likert Scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD)conforming to numerical values of 5,4, 3, 2 and 1 respectively. The instrument was face and content-validated by two industry-based electrical supervisors and another expert in educational measurement and evaluation. The instrument's reliability was established via Cronbach alpha method which yielded a coefficient of 0.83. Mean was used to answer the research question; standard deviation was used to ascertain homogeneity in the responses of the respondents and the hypothesis was tested at 0.05 level of significance using t-test. A total of 21 copies of the questionnaire were administered to the respondents by the researcher. Descriptive statistical tools used for the analysis of the research questions were mean and standard deviation. Statistical package for social sciences (SPSS) version 20.0 was adopted to perform all statistical analysis using t-test.

Results

Data gathered to answer the research question were analyzed and presented in Table 1

Table 1: **Mean Responses on Generic Soft Skills Needed by Polytechnic Electrical/Electronic Technologists for a rewarding Career in Oil and Gas Industry in Niger-Delta, Nigeria**

S/N	Item Statement	Supervisors ($N_1 = 24$)			Graduates ($N_2 = 58$)		
		$\overline{X}_1$	SD_1	RMK	$\overline{X}_2$	SD_2	RMK
1	Interpersonal skills.	4.53	0.51	Agreed	4.64	0.49	Agreed
2	Leadership skills	4.35	0.49	Agreed	4.67	0.53	Agreed
3	Collaborative skills.	4.41	0.51	Agreed	4.67	0.53	Agreed
4	Presentation skills.	4.29	0.59	Agreed	4.69	0.47	Agreed
5	Strategic planning skills	4.35	0.61	Agreed	4.72	0.45	Agreed
6	Project management skills.	4.65	0.49	Agreed	4.67	0.53	Agreed
7	Problem-solving skills	4.59	0.80	Agreed	4.78	0.42	Agreed
8	Time management skills.	4.59	0.80	Agreed	4.61	0.55	Agreed
9	Self-management skills	5.41	5.08		4.58	0.55	

				Agreed			Agreed
10	*Persuasive skills.*	4.53	0.51	Agreed	4.64	0.49	Agreed
11	*Creative thinking skills.*	4.29	0.69	Agreed	4.75	0.50	Agreed
12	*Innovative skills.*	4.12	0.60	Agreed	4.28	0.57	Agreed
13	*Conflict resolution skills.*	4.47	0.62	Agreed	4.36	0.54	Agreed
14	*Effective oral communication skills.*	4.53	0.51	Agreed	4.75	0.55	Agreed
15	*Numeracy skills.*	4.41	0.71	Agreed	4.83	0.45	Agreed
16	*Analytical skills.*	4.00	0.61	Agreed	4.50	0.56	Agreed
17	*Networking skills.*	4.59	0.51	Agreed	4.83	0.38	Agreed
18	*Written communication skills.*	4.65	0.61	Agreed	4.86	0.42	Agreed
19	*Information and communication technology (ICT) skills.*	4.02	0.64	Agreed	4.12	0.56	Agreed
20	*Effective listening skills.*	4.59	0.62	Agreed	4.72	0.57	Agreed
21	*Logical reasoning skills.*	4.41	0.51	Agreed	4.81	0.47	Agreed
	Average Mean/SD	**4.47**	**0.81**		**4.64**	**0.50**	

The result as shown in Table 1 revealed that electrical supervisors and graduates need generic soft skills for a rewarding career in oil and gas industry in Niger-Delta, Nigeria. This could be seen with mean of 4.47 for supervisors and 4.64 for graduates.

Discussion

The finding of the study revealed that generic soft skills are needed by polytechnic electrical/electronic graduates for a rewarding career in oil and gas industry in Niger-Delta, Nigeria as perceived by supervisors and graduates. This implies that in addition to the acquisition of job specific technical skills, electrical engineering graduates also need to acquire generic soft skills to secure and maintain job positions in oil and gas industry. This finding agrees with Aluko (2014) who found that employers require graduates to demonstrate a range of broader skills and attributes that include team-working, communication, leadership, critical thinking, innovation, problem solving and managerial abilities for quality services in the world of work. Similarly, the finding of the study supported the views of Robbles (2012) who submitted that graduates need generic soft skills for proficiency in the labour market, stressing further, that among soft skills needed for productive work in the oil and gas industry, communication, integrity, interpersonal skills, positive attitude, professionalism, responsibility, courtesy, flexibility, teamwork and work ethics are common. Furthermore, the finding agrees with

Ogwo (2010) who posited that graduates need basic reading, writing, listening, numeracy, human relations, team working, planning, goal-setting, motivation, self-awareness, tenacity, flexibility, self-discipline and problem-solving abilities among others for a rewarding career in the world of work as these generic skills cannot be done without in any field of human endeavor.

Conclusion

Employment of all categories of graduates in any industry hinges on the acquisition of special skills relevant to the industry for a productive work. Thus, graduates of electrical and electronic engineering from Nigerian polytechnics need to develop relevant generic soft skills for job roles in the oil and gas industry since the acquisition of such skills enhances the possibility of securing employment in the oil and gas sector for a rewarding career in the industry.

Recommendations

Based on the findings of the study, the following recommendations were made:

1.   The National Board for Technical Education (NBTE) should ensure periodic   review of polytechnic education curriculum to incorporate relevant   employability skills needed for all round development of graduates for a   rewarding career in oil and gas industry in Nigeria.

2.   The Federal Government of Nigeria through the Industrial Training Fund (ITF) should ensure functional collaboration with local industries to strengthen the Students Industrial Work Experience Scheme (SIWES) to enable polytechnic engineering technology students acquire practical skills needed for oil and gas industry jobs upon graduation.

3.   Government should formulate workable policies that will ensure a mandatory Post-HND (Higher National Diploma) internship programme for all fresh polytechnic engineering graduates to acquire relevant employability skills.

4.   The National Board for Technical Education should make industrial visit/excursion a compulsory instructional method for all engineering and technology programmes of Polytechnics to enable students have direct exposure to real industrial work environments that can enhance the development of employability skills for oil and gas industry jobs.

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The Growing Importance of Digital Marketing: A Study on Women Entrepreneurship in Dhaka City

Albina Amin, Ph.D. Research Fellow, Centre of Higher Studies and Research, Faculty of Business Studies; Bangladesh University of Professionals Dhaka; Bangladesh

Abstract

Women entrepreneurs are at vital stages in life for building the human capital that allows women to avoid poverty and lead better, and possibly have a more satisfying life. Women entrepreneurs can play an active role in combating poverty in Bangladesh. Digital marketing, also called online marketing, is the promotion of brands to connect with potential consumers using the internet and other forms of digital communication. This paper focuses on digital marketing in women entrepreneurship in Dhaka city. Observations from two City Corporation's (Dhaka North City Corporation and Dhaka South City Corporation) are used. This paper aims to focus on the online business of women entrepreneurs by using a purposeful sampling method where in-depth interviews were carried out over a two to three months time period. It utilizes a qualitative methodology by conducting interviews with forty-four women entrepreneurs of online business holders located in both Dhaka city corporations. This reserach is focused on resource- based theory and here the main resource is digital marketing. Results show that women entrepreneurs are playing a successful role via digital marketing. Digital marketing means using digital channels, like search engines, social media, email, mobile apps, and websites, to promote a product or service. *The lower level of self-employed women is not visible in every sector. But they are visible in digital marketing via* search engines, social media, email, mobile apps, and websites. *Women are creating their place using social media as a powerful platform. The study aims is to analyze the social myths about women entrepreneurs in digital marketing in Dhaka city. Moreover, digital marketing has minimal upfront costs, making it a cost-effective marketing technique for women entrepreneurs in Dhaka city.*

Keywords: *Women Entrepreneurship, Women Entrepreneurs, Social Myth, Digital Marketing, Dhaka, Bangladesh*

Introduction

Today's business market is excessively competitive to sustain as the development of digital media has changed the traditional market situation (Amin, 2019). Firms can engage more customers within a shorter period, and customers also have multiple options to make purchase decisions from diverse regions. Therefore, the involvement of women in various entrepreneurial activities has empowered them in social, economic, and cultural fields. Studies on women's entrepreneurship show that many different factors have an impact on a woman's decision to become self-employed (Amin, 2021a, Amin, 2021b). Two of them are education and work experience (Chowdhury et al., 2013, Amin, 2018a, Amin, 2018b, Amin, 2019). The contribution of women in the economy is very important for the growth of the socio-economic environment of Bangladesh. Without the meaningful and active participation of women, half of the total population, in regular economic activities, a dynamic, and sustainable economy is impossible (Chowdhury, 2007; Amin, 2021a, Amin, 2021b). It emerges that women have not only brought a social and economic change; but also opened up a new dimension in the business area through their active participation in different socio-economic activities in Bangladesh.

Sustainable women entrepreneurship is seen today as a cultural and economic phenomenon in Bangladesh. This entrepreneurship is the creation of new businesses that produce new products and services, thereby ensuring customer needs, creating new jobs, and contributing to the overall economic stimulus and community quality of life, balancing economic gain, regional development needs, and environmental issues (Amin, 2021a, Amin, 2021b). Particular attention is given in recent years, to women's entrepreneurship, believing that women have a lot of potential to create, develop and manage their online businesses (Khan, A., & Islam, M. A., 2017), thereby contributing to a variety of social problems such as women's unemployment in general, the involvement of anti-social activities, lack of employment to etc. (Chowdhury, 2007; Amin, 2020, Amin, 2022). It is observed that sustainable women entrepreneurship is not analyzed much in scientific literature. This study is going to analyze the present scenario of digital marketing of women entrepreneurs in Bangladesh.

Table 1: Internet usage behavior analysis of youth entrepreneurs in Dhaka city

Technology (Internet)	Frequency	Percentages
Facebook	34	77
Instagram	5	11
Websites	3	7
Others (Mobile Apps)	2	5
Total	44	100

Source: Amin (2019), Amin (2020)

Table 2: Cities with the largest number of active Facebook users

Top Cities	Users	Total (%)
Bangkok	30,000,000	1.5%
Dhaka	22,000,000	1.1%
Jakarta	22,000,000	1.1%
Mexico City	17,000,000	0.9%
Sao Paulo	13,000,000	0.7%

Source: Global Digital Statshot, 2017 (According to a study conducted by We Are Social and Hootsuit. The study was conducted in 2016) (GDS, 2017)

According to table 1, Facebook is very popular in Dhaka. Many people of Dhaka city do not know about using the internet, but they are using Facebook (Amin, 2018b; Amin, 2019; Amin, 2020). The internet users of Bangladesh spend a staggering amount of time on Facebook. According to the Q2 report of 2017, Dhaka is ranked second in the world in terms of having the most active Facebook users (GDS, 2017; table-2).

Statement of the Problem

Digital marketing, also called online marketing, is the promotion of brands to connect with potential consumers using the internet and other forms of digital communication. This includes not only email, social media, and web-based advertising, but also text and multimedia messages as a marketing channel (Khan, A., & Islam, M. A., 2017; Amin, 2019). To sum up, if a marketing campaign involves digital communication, it's called digital marketing (Amin, 2019). However, digital marketing has become increasingly important because of how accessible digital channels are from social media to text messages, there are many ways to use digital marketing tactics to communicate with a firm's target audience. Additionally, digital marketing has minimal upfront costs, making it a cost-effective marketing technique for women entrepreneurs in Bangladesh (Khan, A., & Islam, M. A., 2017; Amin, 2018b). Digital marketing has become prominent largely because it reaches such a wide audience of people (Amin, 2022). However, it also offers several other advantages that can boost women entrepreneurs's marketing and management skills.

Without the entrepreneurial efforts of this large group population, it is very tough to accomplish sustainable economic development in Bangladesh (Uddin et al., 2015). Mainstreaming women in industrial activities can substantially contribute to economic growth and empowerment (Amin, 2017; Amin, 2018a). To support women to release their creative potential as entrepreneurs innovative and specialized support services are needed. Although some specialized funds and programs have been undertaken to facilitate credit towards small businesses with more relaxed conditions but in practice, in most cases, entrepreneurs are required to offer collateral to guarantee loan repayment. The majority of

the women do not possess any assets and cannot formally offer the necessary securities against loans (Amin, 2018a; Amin, 2018b; Amin, 2021a). Due to the complexities in the social environment and administrative structure, women's entrepreneurship in Bangladesh is more challenging (Amin, 2018b). Many social and operational constraints continue to restrict women from starting and running economic enterprises. But the development of women's entrepreneurship can offer excellent opportunities for the development of one-half of the population and the overall socio-economic progress of the country (Duflo, 2012)

It is observed that customers have plenty of opportunities to engage themselves in the digital platform (Amin, 2019). Business firms additionally have different alternatives, including growing correspondence through different digital media to create wider scopes to connect with clients in the global village (Khan, A., & Islam, M. A., 2017; Amin, 2019). According to (Retail customer experience, 2011), it has integrated different types of marketing activities through electronic devices. Akhtar (2011) specified that the most important role played by digital media is that, it has changed the strategy of communication among customers and digital marketers. There is a research gap between identifying the growing importance of digital marketing and women entrepreneurs in Dhaka city. This study is going to fill these gaps in a proper methodological way.

Objectives of the Study

It observed that women have brought social and economic change, and opened up a new dimension in the business area through their participation in different socio-economic activities in Bangladesh (Amin, 2018a; Amin, 2018b). The purpose of the study is to investigate the growing importance of digital marketing in women's entrepreneurship to ensure its growth and development in Dhaka city. To achieve this objective the following specific objectives are outlined:

a) To analyze and discuss the social myths of women entrepreneurs in Dhaka city

b) To explore the power of digital marketing for women entrepreneurs in Dhaka city

Methodology of the Study

In light of the objectives of the study, the paper has been designed to illustrate the available support services as well as their impact and effectiveness on women's entrepreneurship in Dhaka city. To this end, an extensive literature survey has been conducted. It utilizes a qualitative methodology by conducting interviews with forty-four women entrepreneurs of online business holders located in both Dhaka city corporations (Dhaka North City Corporation and Dhaka South City Corporation). The choice of the sample size is based on the work of Schoof (2006) and Uddin et al., (2015). This paper aims to focus on the online business of women entrepreneurs by using a purposeful sampling method where in-depth interviews were carried out over a two to three months time period (from 1st May 2022 to 16th July 2022). Dhaka city has been selected for only one reason. Women entrepreneurs in Dhaka city are more active and the number of online business holders is greater than any in other division of Bangladesh (Amin, 2018a; Amin, 2018b; Amin 2019; Amin 2020).This research is focused on resource-

based theory and here the main resource is digital marketing. According to Smith et al. (2013), Suddaby et al. (2015), Ramadani et al. (2015), Amin (2018b), qualitative research is better for in-depth research perceptions into understanding the complex psycho-social issues in the case of women entrepreneurs. Other data and information from secondary sources were collected by consulting various relevant journals, studies conducted by various donor and development agencies, and publications of the Asian Development Bank, International Labor Organization, Bank of Small Industries and Commerce, Bangladesh Bureau of Statistics, etc.

Resource-Based Theory and Digital Marketing

Research has proved the importance of resources to the creation and success of entrepreneurial businesses of women entrepreneurs (Duflo, 2012). The research on entrepreneurship focused on two types of resources; one is tangible resources and the other is intangible resources (Dzisi, 2008). Here in Table 3 details are as follows:-

Table 3: Resources-based theory perception and available resources

Resources	Details
"Human and Financial Resources"	Human, Business capital, personal and professional networks, equipment, all types of secure tangible items
"Human Capital"	All types of intangible items; including creativity, vision, intelligence etc.
"Business Skills and Capabilities"	Management and marketing skills, unique entrepreneurial traits, strong idea generation and proper utilization, using **digital marketing**
"Education"	Education background of an entrepreneur; like a college education, advanced professional degrees
"Previous work and entrepreneurial experience"	Prior work or business experience
"Exposure to Entrepreneurship through Family"	Previous family background business experience
"Financial Capital"	Cash capital comes from many sources, including personal savings, government and private banks, NGOs, etc.

Source: Adapted from Dzisi (2008)

Analysis and Findings (Empirical analysis and findings from own survey)

(Findings through conducting face-to-face Interview)

Figure 1: The Analysis of Conceptual Framework of the Digital Marketing

Source: Empirical analysis and findings from own survey (from 1st May 2022 to 16th July 2022)

According to this study, 100% of respondents agreed that they are successful in their business with low cost and high return profit by using digital platforms. According to Amin 2017, women's entrepreneurship is the process where women can manage their businesses, take all types of business risks, and create jobs for others. It is observed that when women entrepreneurs are using digital platforms in their online business some previous myths of women entrepreneurs are proving wrong. This study is going to find out some myths from previous studies of women entrepreneurship and analyze the results with the survey findings.

Social Myth-6.1: Women work in different sectors than men: Women work in industries with less growth potential for instance the service and retail industry (Amin, 2018b). An additional explanation that concerns the amount of start-up capital and the type of industry that men and women start their businesses in is the amount of fixed costs that differ among industries. Women tend to work in industries that do not have a lot of fixed costs to start a company and therefore need less money to start on their own (Amin, 2018a, Amin, 2018b)

Discussion: According to this study, 90% of respondents claim that women entrepreneurs are working in all products and services sectors with a good amount of starting capital. They also claim that they have started their business out of opportunity, not for necessity.

Social Myth-6.2: Women entrepreneurs are family-oriented; not business-oriented: The studies of Alam and Chaudhary (2008), and Newaz (2009) claimed that women entrepreneurs are family-oriented; not business-oriented, as the family comes first on their priority list.

Discussion: The findings of the study do not support this view of Alam and Chaudhary (2008), Newaz (2009). According to this study, women entrepreneurs are trying their level best to prove themselves as the 'best woman entrepreneur' for themselves and their community reported by 80% respondents. This

study claimed that women entrepreneurs are not family-oriented; they are business-oriented, as their online business comes first on their priority list.

Social Myth-6.3: Women prefer small business: Women have to deal with household activities in addition to having their own businesses (Verheul and Thurik, 2006). These family reasons and the fact that women value flexibility high on their list are possible explanations for why women want to keep their company small (Amin, 2018a). For women, it is also possible that they keep a job next to their own business because women want to avoid risks.

Discussion: According to this study, 95% of respondents do not agree with this myth. They are growing their business day by day by using digital marketing techniques.

Social Myth-6.4: Women's confidence gap: Women are often less confident in their abilities than men because they have a negative image of themselves. This image is also kept negative by the social and cultural factors in the world. It is observed that women have of them self, women differ in the level of experience and education compared to men and this could also have an impact on their level of confidence for starting a company (Verheul and Thurik, 2006)

Discussion: According to this study, 95% of respondents agree that the confidence gap is a myth. They are growing their confidence in online business day by day by using digital marketing techniques. Crosby et al., 1986 claim that a lower level of confidence is existing discrimination that women experience. However, this research suggests that women are not less confident than men.

Social Myth-6.5: Women are more risk-averse: It is observed that women entrepreneurs are more risk averse than men entrepreneurs. Risk-averse entrepreneurs are more likely to depend on their funds (Amin, 2018a; Amin 2018b). It is observed that women sometimes keep a job as wage workers next to their own business to remain an income when something goes wrong with their business (Amin, 2022).

Discussion: According to this study, 95% of respondents do not agree with this myth. They love to take risks in their online business.

Social Myth-6.6: Fewer hours to work due to household activities: Women possess fewer hours to work, due to household activities (Amin 2021a). This lack of work hours is not because women do not want to work, but because they have more diversity in their daily work activities.

Discussion: According to this study, 91% of respondents do not agree with this myth. They prioritize their work hours more than other activities.

Social Myth-6.7: Start-up capital and lack of social capital: Due to lack of social capital, poor people in the rural area do not have social networks and this deprives the target groups of a key linkage with business partners which could otherwise have provided valuable assistance regarding different aspects of business development. Women entrepreneurs appear to receive lower capital funding from banks and other institutions (Brush, 2006; Brush et al., 2006).

Discussion: According to this study, 80% of respondents do not agree with this myth. They claim that women entrepreneurs appear to receive a good amount of capital funding support from banks and other institutions. For example, Bangladesh Rural Advancement Committee (BRAC) provides training facilities in the areas of human development and management and occupational skill development for both men entrepreneurs and women entrepreneurs (www.brac.net).

Social Myth-6.8: Families feel more comfortable supporting financially a male entrepreneur: Roy (2016) states that families feel more comfortable supporting financially a son, than a daughter for capital in Bangladesh.

Discussion: According to this study, 91% of respondents do not agree with this myth. They claim that families feel more comfortable supporting financially a woman entrepreneur, than a man entrepreneur. Furthermore, it is inspiring to mention that today's women are attracted to establishing their own online business professionally as a career.

Table 4: The social myths of women entrepreneurs in Dhaka city

No	Social Myths of Women Entrepreneurs (According to this Study)	Survey Results (True or False)	% (percentage) Supported by Respondents
1	**Women work in different sectors than men**	False	90%
2	**Women entrepreneurs are family-oriented; not business-oriented**	False	80%
3	**Women prefer small business**	False	95%
4	**Women's confidence gap**	False	95%
5	**Women are more risk-averse**	False	95%
6	**Fewer hours to work due to household activities**	False	91%
7	**Start-up capital and lack of social capital**	False	80%
8	**Families feel more comfortable supporting financially a male entrepreneur**	False	91%

Source: Findings from own survey (from 1st May 2022 to 16th July 2022)

Results and Discussion

The growing importance of digital marketing: Consumers usually prefer reasonable and hassle-free procedures when they choose to purchase from a shop or online market. Hence digital marketing fulfilled their needs. Digital marketing is smarter than traditional offline marketing approaches. Once a customer visits an online shop and picks their desired item, they recall their previous purchase experience to revisit the shop in the future (Jackson, 2011, Amin, 2018b). This research also supports this concept. By using digital marketing, many myths about women entrepreneurs are proven wrong. Moreover, women entrepreneurs always seek out sponsors and role models for their online business in Dhaka city.

Build a strong network: The use of technology is an empowerment tool for women entrepreneurs to operate online stores in Bangladesh (Haque and Quader, 2014). Women entrepreneurs are always active on all types of social networking sites; like Facebook, Instagram, WhatsApp, Viber, and Imo, etc. This includes not only email, social media, and web-based advertising, but also text and multimedia messages as a marketing channel (Amin, 2018a). According to this study, the researcher can figure out that women entrepreneurs are selling products within their networks in Dhaka city.

Preferences and motivations: Women entrepreneurs have different preferences and motivations than men entrepreneurs (Amin, 2018a). It is observed that the primary reasons for being entrepreneurs are flexibility, self-fulfilment, and job satisfaction. On the other hand, men entrepreneurs seem to value profits and income as their primary drivers to start an online business (Buttner and Moore, 1997). The findings of the study also supported the view of Buttner and Moore, 1997.

Women entrepreneurs are more active: According to this study, self-employed women are more active in digital marketing in Dhaka city (reported by 95% of respondents).

Earn more than female wage workers: Another interesting finding of this study is that women entrepreneurs in online businesses appear to earn more than the female wage worker (reported by 90% of respondents).

Conclusions

Women's entrepreneurship is the key to the creation of new enterprises that energize and revitalize the economy ((Brush, 2006; Brush et al., 2006; Amin, 2017). It catalyzes the process of industrialization and economic growth. Women entrepreneurs can play a vital role in combating poverty (Amin, 2018a; Amin, 2018b, Amin, 2021a). The emergence and development of women's entrepreneurship largely depend on the supporting conditions of different factors such as economic, social, cultural, and psychological. To improve the socio-economic status of women in Bangladesh it is necessary to formulate appropriate policies, take necessary actions and introduce effective measures to integrate women into the mainstream of the development process (Amin, 2018a; Amin, 2018b; Amin, 2021a). It is observed that the importance of women entrepreneurs and digital marketing in the national development process has been acknowledged by successive governments (Amin, 2018b).

Since the 21st century, the growth of women entrepreneurs is developing day by day all over the world (Amin 2017, Amin 2018a, Amin 2018b). Today's business market is excessively competitive to sustain as the development of digital media has changed the market situation (Khan, A., & Islam, M. A., 2017). Firms can engage more customers within a shorter period and customers also have multiple options to make purchase decisions from diverse regions (Amin 2021b, Amin 2022). Nowadays customers think about the future repetitive purchase based on the firm's online performance especially how they try to reach customers through their digital marketing approach (Haque and Quader, 2014). This study contributed to the idea of the social, economic, and regulatory situation as a precondition for the growth of the digital marketing of women entrepreneurs in Dhaka city. This study has analyzed eight social myths about women entrepreneurs in Dhaka city. All of the myths are proved wrong with the help of the respondents of this research paper. Digital marketing is an important element that women entrepreneurs can concentrate on to increase their business growth in Dhaka city (Khan, A., & Islam, M. A., 2017; Amin, 2018b). Dhaka city is growing as an important hub for women entrepreneurs in Bangladesh (Amin, 2021a). With the increase in tech and creative talent (Amin, 2022) and a great source of women entrepreneurs, and customers, more promising startups are being developed in Dhaka city (Amin, 2018a; Amin, 2018b).

Limitations and ideas for further research

The author of the research paper believes that a lot of research on women entrepreneurship is not done yet. This is why there still is a lot to learn about women and women's entrepreneurship. Women entrepreneurship is for a large part still undiscovered and therefore many ideas for further research can be considered. During this research, some limitations and ideas for further research came forward. One of the limitations of this research is the period. This research is done for the year 2022. This is at the beginning of the credit crisis of the post-pandemic (COVID-19) situation which could have a big influence on the number of potential women entrepreneurs because a lot of people want to go for safety or started because they got fired from their job as a wage worker (Amin, 2019; Amin 2020). This could decrease the number of entrepreneurs but increase the number of necessity entrepreneurs, due to unemployment (Amin, 2019). To take away the risk of biased results it is an idea for further research to run the regression over multiple years. This analysis has to be done years before the credit crisis to see what the effects are on the economy. It is also possible to test the effects of the variables during the pandemic period. This way more can be learned about the decisions that people make during a pandemic period crisis and it is tested what kind of effects the credit crisis has on opportunity and necessity entrepreneurship and the variables that have an impact on it. Besides that the differences between men and women can also be considered as women appear to be more successful than men in digital platforms (Amin, 2018b). The future research direction is that men entrepreneurs differ from women entrepreneurs but also that opportunity entrepreneurs differ from necessity entrepreneurs in the digital marketing process.

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Xurtials Career Development Center (XCDC) is engaged in research, publication and training on skill development, resource mobilization and employment creation. The core responsibility of XCDC is to promote and develop a culture to inculcate and exercise proficiency, professionalism and productivity at individual, enterprise and policymaker level.

The vision of XCDC is to support for creating a poverty free and unemployment free world and it's mission is to develop skilled and enlightened workforce.