
The Use of Digital Transformation to Address Education Challenges Caused by COVID-19 in Developing Countries

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Abstract: The abrupt coming of Covid-19 has been drastically altered the way the whole world is conducting all its sectors. The purpose of this study is to examine the use of digital transformation to address education Covid-19 challenges, bringing digital opportunities and lessons to developing countries particularly Uganda and Tanzania. This is motivated by the massive challenges, which the education sector in developing nations like Uganda and Tanzania is facing due to covid-19 pandemic outbreak, where students have not be learning since the outbreak in March 2020, hence affecting their normal progress, among other costs. It should be recalled that, the pandemic was first reported on 27 December 2019 in China- in the capital city of Wuhan, in Hubei province [31]. It immediately spread like bush fire and affected mostly at first European nations of Italy, United Kingdom, German France, and United States of America (leading currently). The pandemic later in early March 2020 spread in Africa, which abruptly left them with no choice other than closure of their borders, implementation of WHO guidelines on covid- 19. There was abrupt closure of sectors, which started from education to the rest, apart from the health sector to cater for the patients in many countries including Uganda and Tanzania. This study utilized qualitative method; narrative approach and literature review method, and narrative data analysis and contentment analysis were used. Findings revealed that the use of digital transformation in the education sector has numerous benefits and if embraced fully, it will address the key challenges faced by the education sectors of Uganda and Tanzania as developing countries. The study also revealed that Covid- 19 has increased the use of digital transformation in home personal learning among students who were prior facing a challenge of technophobia and had resorted to brick and mortar learning. The study recommends the adoption and implementation of the proposed of digital transformation framework in education sector to attain UNDP goals, UN sustainable development goals and equip the young generation with digital skills which will eventually reduce poverty via creative and innovative digital online jobs, hence narrowing the digital gap between MDCs and LDCs. This study has limitations, implications and recommendations as detailed in the paper.

Keywords: Digital Transformation, Education Challenges, COVID-19, Developing Countries

1. Introduction

Beyond measuring doubt, digital transformation in various businesses and organisations throughout the world has resulted to voluminous benefits [34, 16, 20, 36, 14]. In the world over countries which have adopted digital transformation by using ICT in their daily operations are reaping these benefits like efficient and effectiveness at work, increased productivity, reduction in paper work, spread and fast movement and accessibility of valuable information, timely reports, continuity in daily business operations,

transparency, accountability, creativeness and innovativeness, to name it.

Covid-19, also called corona virus, is one of the pandemic, first reported in December 2019 in Wuhan city of China, has claimed many lives and left many economies bankrupt especially the developing nations like Uganda. Despite the fact that by the time of the write up-Uganda had no death but the effects of lock down have resulted to other disastrous effects and caused death in some areas according to daily monitor news and other local news reports. This pandemic of covid- 19 began to spread like bush fire and affected at first

European nations of Italy, United Kingdom, France, and United States of America (leading currently) [37]. The pandemic later in early March 2020 spread in Africa, which abruptly left them with no choice other than closure of their borders, and implementation of WHO guidelines on covid-19 [31]. There was abrupt lockdown of sectors, which started from education to the rest, a part from the health sector to cater for the patients in many countries including Uganda and excluding Tanzania. This study examined the use of digital transformation to address education challenges caused by covid-19 pandemic in developing countries like Uganda and Tanzania. These countries were forced to close their education sector in the month of March 20th and 24th respectively. As a result, students have missed their education for close to three months.

Uganda and Tanzania through their health sector and head of states, although slightly used different approaches to address covid-19, their overall objectives were the same of being instrumental in fighting covid-19 basing on each country's history, culture, political and economic aspects. It is on this note that the authors personally, thank their tireless efforts, that of the medical doctors and financial donors for the work well done in saving the lives of their citizens. The strict abrupt measures of checking all people thoroughly at all airports and boarders, quarantining all people entering the country at their own costs, and shutting down boarders, null flying/ cancelling all air flights and later banning all passenger flights, and eventually total lock down by shutting down all sectors, apart from the health sector and those supplying essential need. This study findings from Narrative analysis and literature review approach, suggest that digital transformation once fully adopted, will guide not only Ugandan and Tanzania Universities (like MUK and UDSM) and Schools but also other mushrooming countries on how to address the challenges when faced in future with similar abrupt pandemics to stabilize their Education sector as well as other related sectors for sustainable human development, basing on the recommendations given.

2. Literature Review

Digital transformation is the outcome of digitization process, which implies the usage of digital strategies to alter, shape and develop various business models from traditional ways to customer oriented business with the aid of digital technologies [7].

Digital transformation is the application of the current digital technologies like, analytics, social media, mobile networks, aimed at assisting main business progress such as restructuring the operations, boosting the experience of business customers [6], hence stretching beyond digital resources to added value and increased revenue oozing from digitized assets [40]. Digital transformation is the use of ICT in huge automation to establish fresh capabilities in the business arena, societal lives, government sector (Martin, 2008), and increase performance drastically in an enterprise [30].

Digital transformation in this study in this study refers to the use of recent ICTs by the education sector in the developing countries to address the challenges posed by covid-19.

Education Challenges. In this study, these are the hindrances, which have blocked students and their facilitators from continuing with normal education due to covid-19 outbreak, hence making them to stay at home for months since March 2020 in developing countries.

Covid-19. Covid-19 simply stands for corona virus disease, which began in 2019 and affects the respiration system of the infected person who contracts it via Silva fluids from a positive person with covid-19. It has symptoms of dry cough, headache, tiredness, sore throat, chest pain, diarrhea, poor breathing, and inability to smell and taste edibles, high temperature (fever), and joint pain, conjunctivitis, discolouration of toes and fingers, among others.

Developing Countries. In this study, developing countries are poor countries of Uganda and Tanzania, whose poor brick and mortar education systems were shut down, due to the covid-19 outbreak in March 2020 at the time of conducting this study.

2.1. Theoretical Review

The theory selected for this study is the Unified Theory of Acceptance and Use of Technology (UTAUT) developed in 2003 by Venkatesh, Morris, Davis and Davis. UTAUT assumes the individual's internal schema of beliefs [26-28]. A number of scholars have applied UTAUT to investigate various issues such as success in e-government services, meta-analysis, health, ICT adoption [33, 18, 1]. For instance, Kelefa *et al.* [18] applied UTAUT to investigate cloud-based mHealth service for primary care and found that there were insignificant results between performance expectancy and behavioral intention. However, the study found that there was a significant effect between facilitating conditions and behavioral intention. The UTAUT theory was selected for this study because UTAUT emphasizes technology usage and assumes that an individual's behavioral intention to use a technology is influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions. For this study, performance expectancy and effort expectancy usability and benefits respectively were utilized to forecast the relationship between digital transformation and education challenges caused by covid-19 with specific objective that argues that there is a significant relationship digital transformation usage and addressing educational challenges caused by covid-19.

2.2. Empirical Review

Reis *et al.* [38] in their study examine the insights of digital transformation and areas for further research. The study findings revealed that managers should opt to adapt to new digital reality in their business strategy. The study discovered that there is no doubt that digital transformation has reached all sectors in the business world, however, there

are some areas of which have extra projections of being expanded in the near future than the rest. The study also revealed that there are many opportunities plus challenges of digital transformation.

The current situation worldwide dictates that digital transformation is not optional. Nations have resorted to innovate and renovate all what they are doing in all their sector daily business operations, by incorporating ICT. This is all aimed at achieving a competitive edge and reap all benefits that accrue from embracing ICTs and achieve sustainable development. Similarly, scholars have argued that those businesses and organizations, which are still using traditional brick and mortar, will be wiped out automatic by the digital era in this 21st century for failing to respond to customers' e- demands supported by mobile technology.

Covid-19 is a pandemic, which has necessitated proper planning in the education sector to forecast the abrupt and erratic disruptive changes [22]. This therefore can be mitigated by using digital transformation in the education sector to counteract the future uncertainties, which has affected the normal progress of studies among learners.

The use of digital technologies can improve the performance of an industry, as well competitiveness. This can be seen in terms of innovation procedure via supporting the adaptation and teamwork, plus the results, which offers fresh functionalities and new value creation via digital creation [19].

Marcon *et al.* [19] investigated barriers to digitalization of services and used qualitative focus group comprising of researchers, consultants and managers perception. Findings revealed that the consultants perceived greater strategic barriers, while managers perceived barriers related to operational activities.

Bharadwaj [3] addressed the issue of digital transformation where they asserted that it is vital to amalgamate Information Technology strategies together with business strategies to form the ample digital business strategy, which can as well be used in this study to assist the education system strategies in the developing countries of Uganda and Tanzania.

Drnevich and Croson [5] advocated that digital transformation might influence all organisation's business strategic levels and her proficiencies. They further urged that digital business strategies often describe desired future business opportunities and strategies for firms that are partly or fully based on digital technologies, they do typically not include transformational insights on how to reach these future states.

Digital transformation Initiatives [33] Research reports emphasizes that digitization within private and public sectors including that of education sectors, industry and the entire community, open up new levels of growth and prosperity. The report also revealed that digital transformation might convey one hundred million USD in terms of value in the next decade, to both the various organization's business and the people in the given community [33].

Digital transformation has widely spread due to its

attached benefits such as increased profits in businesses of all types and revenue to the governments and telecommunication companies. This is mostly witnessed in more developing countries which have fully embraced digital transformation and developing countries like Uganda and Tanzania are still lip frogging, hence the need to style up and adopt the current technologies like their counterparts so as to address the current and future misfortunes [14].

Fofanah [8] study on ICT usage in teaching and learning at Njala University envisaged that students and staff had less access to facilities of ICT in the University. The study further revealed that 63% of the respondents never had access to the University computer laboratory and at times utilized the university Internet, which was too slow. Conversely, 47% had at times internet access from their homes.

3. Research Methodology

This study used case studies of Uganda and Tanzania as the suitable representative of developing countries, which used different methods to address covid-19 challenges. The reason for the choice is that both still faced similar educational challenges despite the varying methodological approaches to address covid-19. Narrative and literature review approaches were used to collect data, which was analysed using narrative analysis plus content analysis.

4. Findings of the Study

Findings revealed that the use of digital transformation in the education sector has numerous benefits and if embraced fully, it will address the key challenges faced by the education sectors of Uganda and Tanzania as developing countries. The study also revealed that Covid- 19 has increased the use of digital transformation in home personal learning among students who were prior facing a challenge of technophobia and had resorted to brick and mortar learning. The study recommend the use of digital transformation post Covid -19 in education sector to attain UNDP goals, UN sustainable development goals and equip the young generation with digital skills which will eventually reduce poverty via creative and innovative digital online jobs, hence narrowing the digital gap between MDCs and LDCs.

Findings revealed that digital transformation by lecturers to offer students online education during this corona virus lock down was missing. This has caused students to lag being in terms of academic progress due to lock down. Literature reveals that digital transformation is highly and urgently needed at this critical moment when students especially in Uganda and Tanzania are still at home without studying [16]. This will enable students continue with their normal studies and be assessed online. Digital transformation was a redeemer for continual monitoring and evaluation of both students and lecturers by their top managers and other stakeholders in this digital era.

4.1. Challenges of Digital Transformation

Digital transformation is the right way to address Education challenges in the developing Countries; however, these countries still face a big challenge of inadequate ICT infrastructure, which is a foundation stone for electronic learning to take place [13, 12].

More so, there is also of digital divide in all sectors especially the education sector between the developed countries and developing countries, which has widened more due to covid -19. For this reason therefore, DCs like Uganda and Tanzania need to adopt the current ICTs needed in e-learning to reduce this gap.

There is inadequate e-readiness among the Ugandan and Tanzanian students and most lecturers and teachers. This partly explains why they have not been able to deliver online studies in all schools and colleges during their closure due to covid- 19 season. Lecturers, teachers, students and pupils need to have prior ICT training and training materials, fast internet connectivity, to be able to cope up with digital transformation in the education sector. This is has been a big challenge in Uganda and Tanzania where internet connectivity is still a problem especially in the rural parts and in urban areas it is slow and un reliable [17].

According to Kelefa *et al.* [18] argued that challenges that deter these developing countries like Tanzania to achieve digital transformation like e-resources undependable power supply, slow internet connectivity, inaccessible full e-articles, irregular power supply, insufficient power supply, insufficient ICT Infrastructure and less skills, with limited knowledge, and unapproachability of e-resources outside university premises due to IP address limitations. The study findings showed that there is need to promote the utilization of e-resources via digital technologies to improve the quality of learning, teaching and research.

Digital transformation performance challenges also hinders straight the adoption and implementation of digital transformation strategies and inadequate levels of confidence to resolve digital transformation snags in many organisations including the education sector [4].

Han [11] argues that digital transformation is faces a foot-dragging (averseness) challenge of some organisations to grab the digital transformation merits and opportunities. It is believed that some people resist to new changes and some have technophobia challenges, which deter them to embrace new digital technologies [13]. This is supported by the study of Wilson [32], who stressed that the majority of business organisations have not invested widely in the digital transformation technologies.

Finally, digital transformation faces challenges such as; limited capacity, and poorly-trained personnel, inadequate top management support, constraints imposed by providers' capacity, and the limited uptake and less active e-participation of e-projects by citizens in the developing countries, Uganda and Tanzania inclusive [17, 14]. More so, these challenges of digitization are often overlooked when it comes to e-project implementation including digital

education [16]. Moreover, there is a challenge of inadequate e-readiness among the citizens, including students or learners, and some facilitators [13]. Finally, the less top management support and bureaucratic tendencies of top management to take up and fully support digital transformation issues in various sectors not only in tourism but also in education, which has affected and delayed its implementation at higher and tertiary institutions of learning in developing countries like Uganda and Tanzania [15].

4.2. Benefits of Digital Transformation

Berak *et al.* [2] in their study about the benefits and barriers of digital transformation in the Germany building construction industry, asserted that, digital transformation yields greater productivity in the construction businesses using case studies of three dimension printing plus Building Information Modeling (BIM) software and derived a model to show the effect of digitization on productivity.

Digital transformation in the education sector is vital since it can entice a voluminous number of international and local students, enables usage of digital teaching materials to improve the teaching-learning experiences and complete training procedure [11, 9].

Gray and Rumpe [10] contend that digital transformation results to new changes in the business model via its digital technologies, which results to value manufacturing opportunities and fresh revenue in any given business.

Hebert [4] studied application of digital technologies in lean global set ups brought new market developments. The study findings revealed that digital technologies added values to the lean global setups in numerous ways. For instance, it increased decision-making procedures in line with strategic and long-term market information. It increased efficient market implementation procedures and narrowed the gap between the strategic long term objectives and local market realities.

4.3. Need for a Customized Education Digital Transformation Framework for Uganda and Tanzania

For digital transformation to make sense in the education sector, developing countries with similar characteristics like Uganda and Tanzania should come up with their individual framework which are tailored to their educational sector and student teachers needs. This implies that the framework should be able to address or clearly stipulate the barriers to digital transformation in the Ugandan and Tanzanian education environments first before dreaming to realise or reap wholesomely the vast benefits that accrue to it. This is in line with the study of Kroll *et al.* [42] who contended that digital transformation technologies are quite very unique, where each technology is designed to serve a specific purpose.

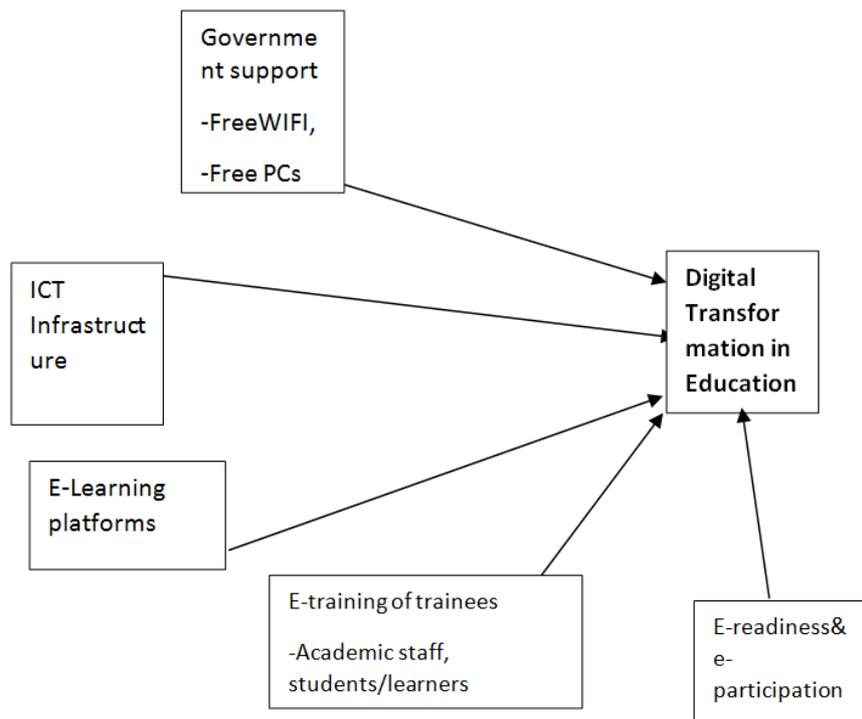
Digital transformation triumph necessitates top managers that are capable of acknowledging that digital transformation and involvement are of high value for them to investment for a while so as to reap long term benefits. They should be willing to put some large chunk of money to obtain the latest digital

learning equipments and technologies, invest in training the academic staff who will also be able to train the learners well using the acquired latest technological skills.

Digital transformation is complex and expensive, but the dividend can be enormous in the likes of increase revenues, decreased expenses, better learning environment, speed and efficiency of work and more importantly able to compete at global level.

Digital Transformation has raised important benefits and pressures to societies in different aspects of daily life especially in developing world. The adoption of digital technologies demand people to develop adequate skills to capitalize on existing and future opportunities in the business and labour markets, respond to communities' needs, and help with sustainability issues.

This work highlights the need for developing countries like Uganda and Tanzania to educate people with skills to lead, manage and operate the digital change. This involves,



Source: Authors Contribution

Figure 1. Proposed Digital Transformation Education Framework (DTEF) for Developing Countries.

Explanation of the DTEF

For the developing countries like Uganda and Tanzania and others with similar characteristics to be able to attain digital transformation in education sector, they should ensure that there are availability of key attributes mentioned in the proposed framework (DTEF). These include among others: Top management support, ICT infrastructure, E-learning platforms, Free E-training of trainees for the lecturers/tutors/facilitators/teachers as change managers and must make sure that the students/learners and facilitators and other stakeholders are e-ready to adopt the digital transformation and actively participate online to reap

developing people capacity to deliver high value contribution enriched with digital technologies to make a decisive impact on their disciplinary fields.

In light of the above, experiential learning is referred as an effective pedagogical approach for digital transformation education because of the emphasis on innovation activities and active learning. An educational framework presented here is to integrate different digital technologies, structure of education components, and strategic drivers for value delivery in an organisations.

The transformational framework calls for a strong leadership as the architect and is built upon the foundation of goals and objectives of the overall organisation. Therefore, the building blocks are tactical leadership, governance, digital competencies, education and training and change management. The organisation's culture therefore becomes the mortar that connects and bind everything together or the live wire that sends power to every part of the building.

voluminous benefits. This will also help to avoid resistance of facilitators, learners and other education stakeholders to the new digital change in education.

4.4. Types of Digital Transformation Technologies Used in the World Today

The abrupt coming of Covid-19 has seen the world with no option but to utilize the current technological tools of the 4th industrial revolution to remain in business and achieve sustainable growth and development. These among others may entail; Artificial Intelligence, Blockchain technologies, 5G networks with Internet Of Things plus smart technology,

Biotechnologies, Autonomous Driving, computer vision, Neurotechnology, personalized and predictive medicine, advanced material and nanomaterials, Space technologies, Geoengineering, ubiquitous linked sensors, extended reality, and Big data analytics [39]. In addition, there are now e-learning and social media platforms such as, Zoom, Microsoft teams, Whatsapp, WeChat, Twoo, Twitter, Facebook, Instagram. More so, mobile platforms and applications (Vodacom, Cell C, MTN, AIRTEL, AFRICEL, TIGO, Mango) and local means of using Television teaching and radio especially in the developing world which are challenged with high cost internet services and ICT infrastructure, and band width.

The developing countries like Uganda and Tanzania need to ensure all the constructs in the above framework work are in place and supported by their governments so as to achieve digital transformation in the education sector to address covid-19 and post covid-19 challenges and attain sustainable development.

5. Conclusion and Limitations

This study examined the use of digital transformation to address education Covid-19 challenges, bringing digital opportunities and recommendations to developing countries particularly Uganda and Tanzania. The study findings revealed that although digital transformation is missing in the education sectors of Uganda (MUBS) and Tanzania (UDSM), it should be implemented to address the education challenges in the covid-19 season and post covid-19, given its massive benefits in this digital era. The study proposed a framework, which can be implemented by the stakeholders of education sectors to reap benefits of digital transformation.

5.1. Recommendations

For digital transformation in the education sector to be efficient and effective in the developing countries, the governments of Uganda and Tanzania as case studies should put the following in place:

Based on findings of inadequate e-readiness and e-participation, there should be initial and continuous professional training of facilitators and students on the other hand. This will help the lecturers and teachers to pass effectively the online education to the students who will also have been trained to use online platforms like Zoom, Webinar, and Microsoft team, to name it. This can be achieved by use of mobile technology and other available current social media platforms to reach all lecturers, teachers, learners/ students wherever they are. This will help them to attain the necessary skills, empower them to achieve digital transformation with impartial quality education and endorsing lifelong education in the covid-19 and post covid-19 seasons. This is in line with the fourth sustainable development goal of United Nations.

There is need to embark on strategizing digital transformation in the education sector in the developing countries of Uganda and Tanzania by employing the

anticipated special effects and align them with different suitable key measurements (technological usage, alterations in the value creation, financial facets and structural adjustments

Also given the fact that digital transformation is always altering with rampant change in technology, there is need for uninterrupted assessment and training of the facilitators and students for the new technologies in the market in the new. This will create awareness and a competitive advantage in the education sector over other sectors and countries, which may be not changing with the change in technological innovations to achieve sustainable development.

It should be recalled that digital transformation via mobile social media technologies like WhatsApp, WeChat, Instagram, Facebook, Tweeter and Twoo, are changing now highly utilized by the current students in developing countries like Uganda and Tanzania. Therefore, this study recommends that the lecturers, teachers and other stakeholders in the education system should utilize the same platforms to reach their students, offer them the education services (lectures/lessons) during this covid-19 season, and post covid-19. This will be possible if the government leaders subsidize on the internet costs to enable the facilitators and learners to be able to meet these costs. If possible, the government can still offer free Internet service to the government learning institutions and subsidize that of the private institutions.

The Universities in Uganda and Tanzania should develop separate educational websites specifically for training students who are currently at home or back in their different countries where most of them are locked down and cant not come back now if any of these two countries resume their normal studies, amidst covi-19 since it not likely to end soon. The government using covi-19 funds to boost the education systems, update regularly with the education contents and other relevant information about the covid-19 and how they can keep safe in line with WHO daily updates should maintain these websites.

The developing countries like Uganda and Tanzania governments need to implement the above framework suggested by the authors to achieve digital transformation in the education sector to address current and post covid-19 challenges, and attain sustainable development.

Finally, top management support is needed to help facilitators and learners in terms of creating awareness, encouraging active e-participation, providing an e-learning environment with all the required digital e-learning materials. This will help them to become e-ready to adopt the digital transformation and be able to engage or participate actively and halt resistance to change.

5.2. Practical Implications

Other countries in Africa should endeavor to adopt digital transformation like online learning to address student-learning challenges during challenging times like the Corona Virus and other disasters, which may crop up in future. This study is significant as add to the sparse literature in the

digital transformation to address the covid-19 challenges and future related abrupt snags, which may crop up in the developing countries and world over.

5.3. Future Studies

Upcoming studies should embark on using qualitative research and or mixed methods on the same topic and use comparative studies, since this study was limited to narrative and literature review based approaches. This study was limited to Ugandan and Tanzanian education sectors but its findings and recommendations can be applied to other countries with similar characteristics like Uganda and Tanzania. Longitudinal studies also may be utilized in future to see the trends of digital transformation usage in the education sector of these developing countries and the recent digital technologies they are using or would wish to use if supported by the governments and other world financial organizations.

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