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## USING ICT TOOLS AND TECHNOLOGICAL APPLICATIONS IN THIS ERA OF THE COVID-19 PANDEMIC TO FACILITATE LEARNING

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### Abstract

*The globe is shaken by the abrupt emergence of the deadly Coronavirus Disease 2019 (COVID-19) pandemic. The global education system has been put to the test by this circumstance, which compelled educators to quickly adopt Information & Communication Technology (ICT) tools and technologies to support instruction. Although, great attempts are made by scholars to study the implications of Coronavirus Disease 2019 on the higher education curricular, there is dearth of previous studies regarding the impact of Information & Communication Technology tools and technological applications to foster learning amid Coronavirus Disease 2019 outbreak. This exploratory study therefore uses a meta-synthesis approach and visited relevant literatures as lens to primarily examine the need to use Information & Communication Technology tools and technology applications to enhance learning in the Coronavirus Disease 2019 age. The research also shed some insight on the difficulties involved with employing Information & Communication Technology tools and technical applications to aid learning in times of pandemic and catastrophes, and it offers potential answers to educational institutions on how to handle these complications. The study's findings suggest that Information & Communication Technology tools and technologies are the magic bullet for optimizing learning in times of disaster like the Coronavirus Disease 2019 pandemic. The study also shows that by overcoming some technical and financial obstacles like high cost of technology devices, electricity problems, lack of expertise, etc., the lessons learnt from the abrupt and compulsory adoption of Information & Communication Technology tools and technologies to lessen the negative effects of the disaster on learning amid Coronavirus Disease 2019 global emergency will help create new opportunities for the use of blended learning approaches to meet the needs of the Coronavirus Disease 2019 disruption and future learning deliveries.*

*Keywords: Engineering; failure; Small, medium and micro enterprises; stagnation; strategy; SWOT analysis.*

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### 1. Introduction

Before now, traditional teaching methods have been widely employed in most educational institutions at all levels, particularly in less developed countries (UNICEF,

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2021). This means that they adhered to the conventional setup of in-person lectures in a classroom. All areas of education have been severely impaired by the COVID-19 pandemic, predominantly given the social segregation rules that are in existence (Dhawan, 2020).

According to the UNESCO (2020) study, the pandemic has a disastrous influence on worldwide education. By May 2020, 95 percent of students worldwide had been affected by the virus pandemic, representing 1.7 billion students worldwide, from kindergarten to postgraduate, in more than 200 nations (UN, 2020). The governments worldwide ordered school and university closures. Based on this fact, many schools and institutions around the world began to use ICT resources and technological applications to promote learning.

In response to COVID-19 outbreak, governments and academic institutions throughout the world are launching a number of legislative initiatives to make sure that learning not only continues but is also supported in an effort to stop the virus's spread (Zhang, Wang, Yang, & Wang, 2020). These same scholars averred that during the COVID-19 pandemic, significant nationwide initiatives are forming and changing swiftly to assist remote learning, distance learning, and online learning through the adoption of various ICT tools and technologies.

The study by Coman, Țiru, Meseșan-Schmitz, Stanciu, and Bularca, (2020) found that many institutions have switched from an offline to an online mode as a result of the Corona Virus. The aforementioned finding is supported by the findings of (Dhawan, 2020), that understanding the critical necessity of this COVID-19 era, many colleges around the world have completely digitalized their activities. Consequently, institutions that were previously resistant to change will have no choice but to accept modern technologies as a result of this crisis. Thus, the COVID-19 disaster will highlight the benefits of implementing ICT tools and technologies for learning. Therefore, at this point in our lives, improving the quality of learning through ICT resources and technology applications is essential.

Pertinent literature (Dhawan, 2020; Mpungose, 2020; Di Pietro, Biagi, Costa, Karpiński, & Mazza, 2020; Almahasees, Mohsen, & Amin, 2021) have shown that no field of study is left behind in the fight to move learning from the usual mode of in-person lesson to a technological-enhanced learning during this troubled time. Not even the medical schools, as medical educators are utilizing a variety of ICT resources and software programs to maintain the continuity of medical education in the midst of the COVID-19 pandemic (Chatterjee & Chakraborty, 2021).

The recent research conducted by Rose (2020) affirmed that the whole preclerkship curriculum has been swiftly moved online in response to COVID-19 by the medical education faculty, with plans made for smaller groups to meet virtually as teams. This is consistent with the position of Kachra and Brown (2020) who remarked that COVID-19 pandemic has relocated the entire health-care residents, moved students of medicine

out of the clinical settings and changed the focus of medical education from offline to the online mode.

Although, literature have outline a number of setbacks in the use of ICT facilities and technical applications in learning. Hinostroza (2018) concluded that majority of academic institutions in developing countries face a number of obstacles when implementing ICT tools and technologies in the learning process, including low computer literacy, ill-equipped classrooms, lack of electricity in most rural schools, expensive and slow Internet connections, and lack of student-accessible to e-learning resources. This is in line with the findings of Murgatrot (2020), that a number of flaws in the use of ICT tools and technologies in learning include the inadequate infrastructure for online education, the lack of expertise among teachers, the knowledge gap, the complexity of the home environment, and more.

Nevertheless, despite some of the above stated restrictions, the COVID-19 circumstance necessitates measures to ensure that learning is unaffected. According to McBrien, Cheng, and Jones, (2009), technology has advanced quickly, making online education simple. A *Suspending Classes without Stopping Learning* policy is implemented in China, for instance, to ensure that learning is never impaired while the country is under COVID-19 pandemic lockdown (Zhang, Wang, Yang, & Wang, 2020). The implementation of ICT tools and technologies in the classroom offers several advantages, including raising students' interest and knowledge retention, promoting individual learning and teamwork, and allowing students to pick and choose the skills they want to acquire (Al-Ansi, Garad, & Al-Ansi, 2021).

This paper presents a study that looks primarily at the need to use ICT tools and technology applications to expedite learning in the COVID-19 age. In doing so, the study discusses ICT tools and technological applications that can support learning in the face of COVID-19 pandemic. In the course of this research, the paper also examines the benefits of applying ICT tools and technologies to learning. It further highlights some of the hitches involved with employing ICT tools and technical applications to support learning in times of catastrophes and ultimately offers potential answers to educational institutions on how to manage these impediments.

This study is organised into six parts. The remaining parts contain the problem statement of the study which is the second part. This is closely followed by the third part which gives a critical review of previous studies and other materials related to the current study, as well as, the theoretical foundation upon which this current work is based. The fourth part presents the study's research methodology which describes the procedures used to achieving the objectives of study. The fifth section is used to discuss findings of the study. The last part is draw conclusions and offer recommendations.

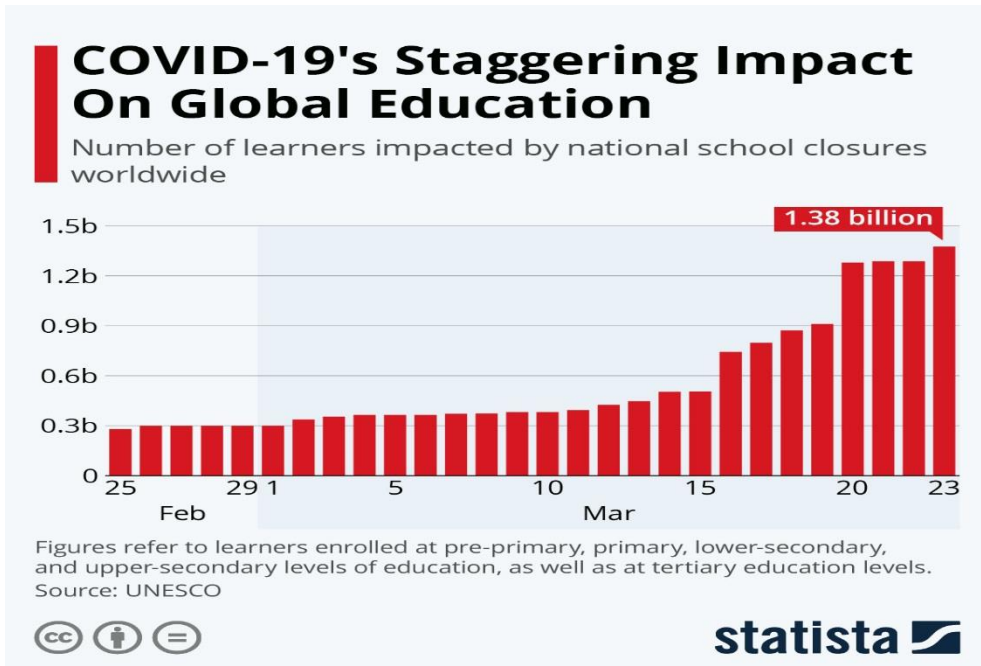
## **2. Problem Statement**

A large number of academic institutions at all levels, the world over, have stopped offering in-person instruction. Due to the unfortunate scenario caused by the advent of

the killer virus rampaging the world, it is unlikely that regular instruction will resume very soon. Consequent upon the stay-at-home policy implementations of governments and the fact that social distancing is so important at this point in time, learning is heavily threatened. Places of learning are having a difficult time coming up with solutions to this difficult circumstance. Due to these factors, we understand that academic institutions urgently require scenario planning (Rieley, 2020).

Thus, the challenging scenario caused by the outbreak of COVID-19 and the need to isolate people in order to stop further spread of the deadly virus, which has led to closure of schools in many parts of the world, provoked the problem statement of this study. For instance, the study by Ali (2020) stated that the COVID-19 pandemic, caused by a novel coronavirus, has forced many colleges and universities to grapple with the problem of how to continue teaching and learning while under the danger of lengthy closures. Thus, education cannot afford to suffer any further setbacks at this time. In a report submitted by the United Nations (2020), The COVID-19 pandemic has created the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries and all continents. Hence, the necessity for this study.

Figure 1 The Number of Students affected by School Closure across the World amid COVID-19 Pandemic



Source: (Statista, 2020)

More so, numerous studies have looked into the use of ICT in education, as well as the advantages and drawbacks of ICT-based learning. Same with the progress and use of technologies in developing and established nations. The use of ICT tools and technological applications to improve learning, warranted by the current condition, is what sets this study apart. Al-Ansi (2017) asserted that ICT applications and techniques are necessary for effective online learning. Thus, due to the COVID-19 pandemic, adopting ICT-based learning becomes the only choice. This research is set to examine the requisite for implementation of ICT tools and technological applications to expedite learning as response to the global viral outbreak and also suggest ways to overcoming challenges that may pose as stumbling blocks to achieving this goal.

Hence, this study formulated the following research objectives in order to achieve the purpose for which it is designed:

1. To discuss the ICT tools and technological applications that can optimize learning in the face of the COVID-19 pandemic.
2. To examine the benefits of using ICT tools and technological applications to foster learning during COVID-19 era and other emergency circumstances.
3. To shed some insight on the challenges involved with employing ICT tools and technical applications to aid learning in times of COVID-19 pandemic and catastrophes.
4. To offer potential answers to educational institutions on how to handle the complications in using ICT tools and technologies to boost learning during COVID-19 age and beyond.

## **2. Literature Review**

### ***2.1. Learning Optimization using ICT Tools and Technological Applications***

ICT tools and technology applications can be used in a variety of ways to improve teaching and learning (Gordon, 2014) and assist departments and instructors in handling administrative tasks within academic institutions (Omotayo & Chigbundu, 2017). Learners can create material and communicate with peers using a range of web 4.0 tools, including social networks and blogs. Additionally, a number of technology-based communication tools, including email and instant messaging software, greatly facilitate the work of the administrative and teaching staff (Huang, Liu, Tlili, Yang, Wang, Jemni, & Burgos, 2020). Accordingly, the utilization of ICT tools and technological applications is a crucial component to maintain learning process during the COVID-19 pandemic.

According to Altun, Kalayci and Avci (2011) technology serves as a catalyst and aids educators in planning and delivery of lessons. Thus, the reason ICT tools and technologies adoption to improve lesson delivery has been widely discussed in many academic institutions throughout the world. This conforms with Al-Ansi, Suprayogo and Abidin, (2019) that learning in schools is positively impacted by the use of ICT tools and applications, and learning at the undergraduate and graduate levels is more significantly impacted by ICT infrastructure, devices, techniques, methods, and applications. In

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consistent with the aforementioned, Ali (2020) added that the reason technology integration in education continues to garner special attention, especially in the wake of the COVID-19 pandemic, is due to the rapid expansion of ICT and technological applications as well as the increased complexity that comes with its exploding potential.

Excitingly, ICT resources for learning come in a broad range today, and many of them are essential to maintaining medical students' instructional continuity during the COVID-19 pandemic (Rose, 2020). The author explained further that, this is simply due to the fact that medical educators are deeply involved with provision of healthcare services to victims of the unfortunate outbreak and because of how crucial it has become to prepare future healthcare providers in light of the worldwide crises. The main types of ICT resources are live streaming services (Abi-Rafeh, El-Hawary, & Azzi, 2019); video conferencing (Hintz, Duncan, Mackay, Scott, & Karimuddin, 2020); teleconferencing solutions (Alvin, George, Deng, Warhadpande, & Lee, 2020); prerecorded videos (Chick, Clifton, Peace, Propper, Hale, Alseidi, & Vreeland, 2020); and social media (Ricciardi, Biondi, & Tamagnini, 2020).

Notably, innovative solutions are given utmost consideration by academic institutions around the world as they strive to combat the pandemic brought on by the unanticipated outbreak of COVID-19 (Liguori & Winkler, 2020). Consequently, it is imperative to switch learning from the usual in-person mode to a technologically-enhanced mode. Hence, the study conducted by Basilaia, Dgebuadze, Kantaria, and Chokhonelidze, (2020) showed that Zoom, Google Forms, Skype, Google Drive, Google Calendar, Moodle, Google Classroom, Open Board Software, Google Jam Board & Drawings, Microsoft Teams, Google Meet, and Google Hangouts, are ICT products that can be very useful to facilitate learning during this period. According to these scholars, these resources work well as a substitute for face-to-face classes.

During this critical period, ICT tools and technological applications are crucial for promoting learning, as they act as the foundation for remote learning, online learning, and distance learning (Ellis-Thompson, Higgins, Kay, Stevenson, & Zaman, 2020). ICT mechanisms like the web, videos, audio, presentations, and e-books improved the way students learn by allowing them to read, listen, and engage in conversation (Sharma, 2018). Additionally, interactions between students and teachers, or even with other fellows via video calls and social media, boost their enthusiasm and drive the students to learn (Al-Ansi et al., 2021). Although, some academic institutions offer online courses and make study materials available through online platform before now, but the sudden eruption of COVID-19 has made more educational institutions across the world to understand better and see more reasons for the need to assume Massive Open Online Courses (MOOCs) to facilitate learning outside of the classrooms.

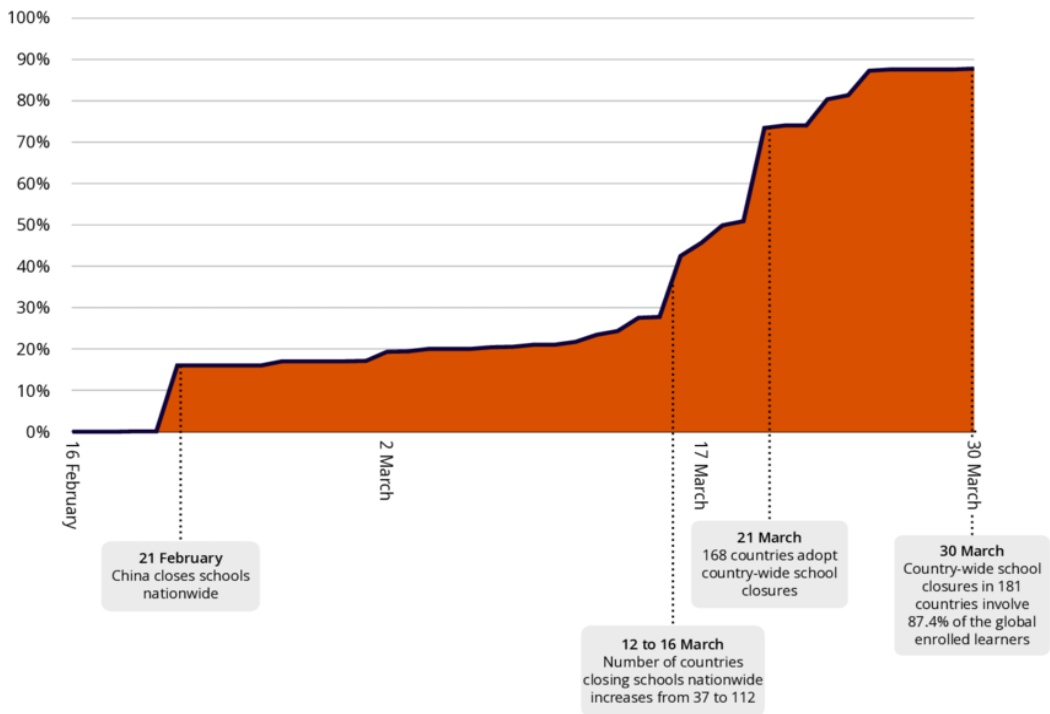
These days, using ICT programmes like WhatsApp, Facebook, Instagram, Telegram, and others to communicate, share information and homework, consult, plan activities on and off campus, and do a variety of other tasks, have become the norm for students, lecturers, and staff. All of the physical and outdated communication tools have been

replaced by modern technological applications, which is now widely utilized in education (Al-Ansi *et al.*, 2021). Notably, social media is crucial for ICT-based learning during the pandemic and for social isolation. Utilizing social media and disseminating knowledge across platforms would greatly improve students' comprehension of difficult concepts and provide them the opportunity to post and share their opinions (Erturk, 2016). More so, teleconferencing programmes like Skype, Moodle, Microsoft Teams, Google Meet and Zoom have become the primary method for ICT-based teaching and learning (Subramani, 2015).

**2.2. The Benefits of Using ICT Tools and Technologies to Foster Learning**

It will not be out of place to say that COVID-19 pandemic has had some beneficial effects in addition to the negative ones it has brought upon the planet. This belief is shared by a number of studies including Dietrich, Kentheswaran, Ahmadi, Teychené, Bessière, Alfenore, and Hébrard, (2020); Talanquer, Bucat, Tasker, and Mahaffy, (2020); Lawrie (2021) who avowed that, the pandemic also provided chances to further research, reconsider curricula, and encourage adaptable educators to use new technologies. Also, sharing in this belief is Lockee (2021) who argued that the positive effects of the COVID-19 pandemic's transition present a variety of intriguing possibilities worth studying in the future, some of which might even become the new norm.

Figure 2 The Percentage of Students affected Globally by School Closure



Source: Reproduction of Jordan, David, Phillips, & Pellini (2021)

Essentially, a recent study carried out by Coman et al. (2020), identified five major benefits of ICT and technology-based learning during the pandemic were highlighted including: (i). Time and cost savings. (ii). Adoption of improved learning technologies. (iii). Gaining new skills. (iv). Constant access to online learning resources. (v). Spending time with family while studying and teaching. The same is true for students, who do not need to rent housing off-campus or live in dormitory with their friends; educators do not need to leave their familiar surroundings in order to administer lessons. Instead, they can remain at home, spend time with their families, and learn or instruct using ICT resources and technical tools (Al-Ansi *et al.*, 2021).

Also, students are encouraged to debate issues with their peers by using social networking platforms to boost collaborative learning activities. This is viewed as an effective way for students to feel like they are in control of the learning process (Kurtz, 2014). Another study by Huang (2017) affirm that the value of collaborative learning in helping students and teachers save time when sending emails, storing, rewriting, and editing materials, among other tasks that increase their productivity.

Besides, in a topical research conducted by Chatterjee and Chakraborty (2021), findings revealed that due to its accessibility, popularity, and attractiveness among students, social media is a common and well-liked ICT tool for collaboration and learning. Facebook groups make it simple for private groups to collaborate on course content. For a small number of people who can participate in the conversation through the web or mobile-based platforms, such groups offer an efficient way to conduct case-based discussions. The well-known instant messaging tool called WhatsApp makes it easy to share multimedia files and instant chats with both small and big groups of people through the internet (Ali, Kardar, & Zia 2020).

Moreover, high levels of interactive real-time cooperation between teachers, students, and peers are made possible via videoconferencing solutions. Given their capacity to mimic in-person connection in close proximity, these gadgets have grown incredibly popular in light of the pandemic. More so, there are some internet resources for instructing surgery (Abi-Rafeh & Azzi, 2020). According to Chatterjee and Chakraborty (2021), additionally useful for distributing and disseminating lectures are prerecorded videos and video sharing platforms. The appeal of prerecorded videos is that they make it possible to access the educational contents whenever the accessor wants, even repeatedly if necessary. These lectures are also based on publicly available lectures that provide equal access to excellent learning resources.

Likewise, medical students can access study materials and attend lectures using computer or smartphone, thanks to online education (Chick et al., 2020). This is especially beneficial for international students, many of whom have returned to their home nations since the pandemic's onset (Sandhu & de Wolf, 2020). Similar to other academic fields, the use of ICT tools has led to a democratization of educational content, enabling students to obtain top-notch edifying lessons from the leaders in their field regardless of distance or cost (Abi-Rafeh & Azzi, 2020).



Furthermore, the accessibility technology applications and ICT tools make it easy to learn anytime and anywhere. Asynchronous and synchronous learning are critical at this time to speed up education and learning. This is significant due to the fact that it eliminates the need for educators and students to worry about timing (Fabriz, Mendzheritskaya, & Stehle, 2021). Numerous online courses are always accessible, allowing students to learn whenever they want. More so, several educational institutions and governments offer remote learning via radio and television, particularly for basic schools, so that students no longer need to congregate in a physical location like a campus or a school (Al-Ansi *et al.*, 2021). Hence, ICT tools make it easy for learners and educators to manage their time resources in the most efficient manner.

### **3. Challenges facing the use of ICT Tools and Technological Applications to Facilitate Learning amidst Pandemics and Catastrophes**

Even yet, the use of ICT tools and technological applications to advance academic interest have recently made significant strides, particularly in light of the unexpected COVID-19 attack. Their application to excel in a variety of endeavors has grown to be crucial in one way or another. As a result, over the past few decades, their nature has significantly affected how education is seen. The learning community still has certain issues with efficiently using ICT tools and technology, nevertheless (Al-Ansi *et al.*, 2021).

World Bank (2020b) stated that in light of the COVID-19 pandemic, majority of students find it extremely difficult to complete online coursework, especially those who are still in areas with limited Internet access and are faced with other numerous obstacles. Thus, developed countries are more effective than the less-developed ones at adopting and using ICT tools and technologies to speed up learning, and different educational systems and policymakers confront distinct challenges around the world.

Garad and Al-Ansi (2021) affirmed that even though most countries are faced with numerous difficulties in relation to ICT-based education, it is more common in underdeveloped nations. These difficulties include issues with electricity, expensive infrastructure, managing and organizing lessons, upkeep of gear and software, a lack of experience, and occasionally plagiarism. Other difficulties related to Internet speed, coverage, and cost.

Dhawan (2020) found that there are differences among students and learners in terms of their abilities and levels of confidence. Some individuals experience discomfort when utilizing the ICT tools provided for learning, resulting to increase in uncertainty and frustration. Particularly, given the sudden need to integrate ICT resources in higher education processes to ensure that learning continued during schools lock down. A Durham University study (Higgins, 2020) had already proven that it was counterproductive to implement a new system right away since some students lack even the most basic digital literacy.

Insufficient personalization of learning processes and insufficient compatibility between the design of the technology and the psychological component required by the learning

process, according to Dhawan (2020), hampered teaching efforts and led to an imbalance. Adding to the already challenging circumstances, some students and educators may live in confined quarters that are unsuitable for coursework and study, and they may have to dig it out with other family members for access to computers and the internet (Cheong, Coldwell-Neilson, MacCallum, Luo, & Scime, 2021).

Flavell, Harris, Price, Logan, and Peterson, (2019) concluded that some academic staff members and students are not prepared for significant changes to their educational system's structure. According to research carried out by Basuony, EmadEldeen, Farghaly, El-Bassiouny, and Mohamed, (2020), technical issues provided a significant challenge for teachers. These issues include poor connection, virus infection, and broken printers.

#### **4. Plausible Solutions to the Impediments in using ICT tools and Technological Applications to Accelerate Learning**

The World Bank is aware that not all educational systems in the world, not even the best ones, may be sufficiently prepared to provide ICT-based instruction to all students on such a broad scale. Decision makers frequently find it difficult to stay up with technological advancements due to the expense and infrastructure requirements (World Bank, 2020b). It should however be established that there must be adequate ICT assistance in the form of infrastructure, tools, hardware, and software support systems in order to improve the delivery of effective learning, particularly at this period of COVID-19 global emergency.

According to a research - Andrew, Taylorson, Langille, Grange, and Williams, (2018) argued that majority of students appear to use information technology based on their replies to technology-related questions. For many academic institutions throughout the world, using ICT tools and technological apps to aid learning at this crucial time should not be considered as a significant change. However, its important to always take into account the learners' technological readiness and accessibility. Tech-based learning initiatives should be created such that they are pertinent, engaging, innovative, student-centered, and group-based (Baldwin & Ching, 2019). Given the worrying effects of the COVID-19 pandemic, it is especially important to speed up the pace of technological advancement and maximize the technical implementation of online education programs (Ali, 2020).

Also, Peña-López (2016) averred that the inclusion of additional supportive variables, such as instructors' preparation, is necessary in order for ICT to be successfully deployed. Ghavifekr and Rosdy (2015) concluded in a study that in order for ICT to be effectively integrated, educators need to have adequate training and assistance in both pedagogy and ICT. For ICT-based instruction, educators must invest a lot of time in developing successful teaching methods. The reason is that effective ICT-based instruction encourages student feedback, increases students' positive curiosity and motivation, and at the same time helps to expand their knowledge of the course content (Francis, 2017).

In addition, another element in the successful employment of ICT tools and technology applications to assist learning is confidence. In the lives of students, the instructors' attitudes and readiness to use ICT, according to Ghavifekr, and Rosdy (2015), make a significant difference. This is due to the possibility that students' learning and skill development may suffer if instructors are unwilling to utilize ICT embedded learning.

Furthermore, it is true that many students today are fortunate to be born at a time when technological advancement had assumed a dominant role; and as such have access and are exposed to technological gadgets like smart phones, computer and other technological accessories and the operations of these gadgets from tender age. This should not be interpreted as implying that students are experts in ICT, as this could be a dangerous misconception. This statement is further confirmed in a study conducted by O'Sullivan (2018), who concluded that many young people, or so-called "digital natives," exhibit limits when using technology. World Bank (2020a) expressed similar views, stating that simply directing students and instructors to sizable online repositories without providing them with the necessary guidance would not go down well during the COVID-19 outbreak. Although, these individuals may be tech savvy, they might not have the theoretical background needed for particular task.

Essentially, there is a critical need to support and empower educators. The World Bank (2020b) states that training and assistance are required for instructors who use ICT tools and technological applications. The body also cautioned that teachers won't be able to support students' learning during this time if they do not have access to enough broadband and a linked device at home. Therefore, in order for educators to successfully deliver ICT-based learning, they need to be given technical, social, and moral assistance.

More so, for everyone to benefit from the advantages of quality education through technologically-enhanced learning, the issues of standardized quality control, qualitative online resources, and tech-based learning need to be addressed right away (Cojocariu, Lazar, Nedeff, & Lazar, 2014). In this time of COVID-19 crises, one should consider developing and improving the quality of virtual courses given in such emergencies rather than just concentrating on the benefits of adopting technologically-enhanced learning (Affouneh, Salha, & Khlaif, 2020).

Finally, tech-based learning involves a lot of effort and money. A large investment is required to acquire the tools and equipment, maintain the equipment, educate the staff, and create the online content. In order to impart education using a digitally enhanced learning mode, an effective and efficient educational system must be created, especially at this time when education is in danger (Dhawan, 2020).

## **5. Theoretical Discussion**

The current study examines the two main families of learning theories: The Cognitive Theories of the Gestalt-Field Family and (Stimulus-Response) conditioning theories of the behaviourist family.

#### **4.1. The Cognitive Theories and the Conditioning Theories**

There are two main families of learning theories that have emerged since the 17th century, according to literature: cognitive theories of the Gestalt-Field Family and (Stimulus-Response) conditioning theories of the behaviourist family. Different definitions of learning have arisen from these various schools of thought and learning theories (Leonard, 2002; Schunk, 2012).

Although the descriptions of these definitions vary, they all share the same fundamental concepts as described in this part. According to Mumford (1980), learning takes the shape of a reasonably permanent shift in behaviour where "learners know something they did not know earlier and can indicate how they know it." As a result, students are able to perform a task that they previously were unable to.

Therefore, using the underlying concepts, this theory develops measures of behavioural changes brought about by the learning process and serves as an invaluable tool for identifying learning outcomes that emerge from behavioural changes in students (Pierce & Cheney, 2013; Toker & Avc, 2015). On the other hand, the cognitive theory develops an understanding of how information gained through experience is processed and transformed into cognitive and intellectual strategies (Bigge & Shermis, 1992), so it is through understanding of the cognitive theory that educators can understand how the information gained is processed in the minds of the learners to develop their intellectual abilities.

While emphasizing that the experiential learning process is a cyclic process that can be conceived in four stages, Kolb, Rubin, and McIntyre (1984) developed an experiential learning model that was based on earlier authors such as Habeshaw (1990) and Piaget (1961). According to Kolb, et al. (1984), the first stage of learning is concrete experience, where learning can happen either through a completely new experience or a reimagined experience that has already occurred. At this point, each learner participates in a task or activity; nonetheless, involvement is the key to learning. Therefore, learning new information requires active participation on the part of the learners as reading or watching alone is not adequate.

The second stage is Reflective Observation, where students are expected to take a step back and consider the work they undertook. The learner has the opportunity to ask questions, talk with others about the experience, and request feedback at this step of the learning cycle. Communication is crucial at this point in the learning process because it gives the student the chance to spot any differences between what they think they know and what they really experienced.

The third stage is known as abstract conceptualization, where learners attempt to make sense of the knowledge they have learned in order to draw conclusions from the

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experience they have had. To do this, they may reflect on prior knowledge, relate new information to old, or discuss theories with peers. The transition from reflective observation to abstract conceptualization, which entails interpreting their experience and making comparisons to their current understanding of the concept and modifying their assumptions on already existing ideas, occurs when learners start to classify concepts and draw conclusions about the events that occurred.

Finally, Active Experimentation is the step that enables the learner to put their knowledge into practice and demonstrate how it relates to the current circumstance in light of the experience they have received. The availability of ICT tools and technological applications, as well as their capacity to facilitate the various stages of the aforementioned learning processes, have also been demonstrated via meta-syntheses (Ahmed & Opoku, 2021).

## **5. Research Methodology**

In light of the COVID-19 pandemic, the global shutdown, and social estrangement, an exploratory study method has shown to be the most effective way to reveal the significant complexities connected with the adoption of ICT tools and technological applications to expedite learning (Ali, 2020). Exploratory investigations are a great technique for gathering initial information to reveal the true nature of the problem and to offer potential answers or novel concepts (Malhotra, Nunan, & Birks, 2017).

Typically, exploratory research conclusions are based on secondary data, such as answers to open-ended inquiries, similar case studies, pilot studies, or even the outcomes of earlier investigations (Babin & Zikmund, 2015; Malhotra, Nunan, & Birks, 2017). Although qualitative research has long been of interest in the field of psychology, meta-synthesis of qualitative literature are highly popular among academics. Similarly, the current study synthesizes erstwhile qualitative studies using thorough qualitative approach to provide in-depth proposition.

## **6. Findings and Discussion**

This section presents the findings of the study as gathered from relevant literature relative to the adoption of ICT tools and technological applications to speed up learning in the face of COVID-19 pandemic. In respect to the formulated objectives of this research, the ensuing findings were made:

1. To begin with, the main types of ICT resources that can be relied upon to deliver the goods during a pandemic in the nature COVID-19 and schools lockdown are live streaming services (Abi-Rafeh, El-Hawary, & Azzi, 2019); video conferencing (Hintz, Duncan, Mackay, Scott, & Karimuddin, 2020); teleconferencing solutions (Alvin, George, Deng, Warhadpande, & Lee, 2020); prerecorded videos (Chick, Clifton, Peace, Propper, Hale, Alseidi, & Vreeland, 2020); and social media (Ricciardi, Biondi, & Tamagnini, 2020).

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In similar vein, the findings of a recent research conducted by Basilaia, Dgebuadze, Kantaria, and Chokhnelidze, (2020) showed that Zoom, Google Forms, Skype, Google Drive, Google Calendar, Moodle, Google Classroom, Open Board Software, Google Jam Board & Drawings, Microsoft Teams, Google Meet, and Google Hangouts, are ICT products that can be very useful to facilitate learning during this period. Accordingly, these resources work well as substitute for face-to-face classes. Likewise, teleconferencing programs like Skype, Moodle, Microsoft Teams, Google Meet and Zoom have become the primary method for teaching online. (Subramani, 2015).

2. In the second place, ICT tools and technology applications make it easy to learn anytime and anywhere. Hence, ICT tools make it easy for learners and educators to manage their time resources in the most efficient manner. This is in conformity with the findings of (Fabriz, Mendzheritskaya, & Stehle, 2021), who revealed that accessibility technology apps and ICT tools make it easy to learn anytime and anywhere. This is significant due to the fact that it eliminates the need for educators and students to worry about timing and location.

The research presented in this paper demonstrates that ICT tools and technology applications support collaborative learning activities among learners and their peers, as well as, between learners and instructors. As a result, the students are able to gain new knowledge and develop better skills. This is consistent with research by Kurtz (2014); Huang (2017); Chatterjee and Chakraborty (2021), who found that social networking sites are popular and widely used ICT resources for teamwork and learning, as well as, improved learning opportunities.

3. Thirdly, in the course of investigation, this paper's findings reveal that less-developed countries and their educational systems experience more difficulties in their adoptions and effective implementations of ICT tools and technological applications to expedite learning during this COVID-19 period, than their counterparts in established countries. This is due to the fact that most of them have not, to a reasonable extent, taken advantage of the vast opportunities presented by technological applications to advance learning, prior to COVID-19 pandemic.

The latter finding is buttressed by Garad and Al-Ansi (2021) affirmed that even though most countries are faced with numerous difficulties pertaining to ICT-based education, it is more common in underdeveloped nations. The finding is further sustained by World Bank (2020b), opining that in light of the COVID-19 pandemic, the majority of students find it extremely difficult to complete online coursework, especially those who are still in areas with limited Internet access and are faced with other numerous obstacles.

In addition, this study findings reveal that major difficulties in the application of ICT tools and technologies to foster learning during the COVID-19 schools lockdown include issues with electricity, expensive infrastructure, slow Internet connectivity, lack of access to the Internet, managing and organizing lessons, upkeep of gear and

software, a lack of experience, lack of technical support, content restrictions, and insufficient resources. This is consistent with the study conducted by Al-Ansi, Garad, and Al-Ansi (2021), it was found that access to Internet, low speed and bandwidth; poor maintenance of ICT infrastructure - the software and hardware; inadequate electricity supplies; lack of human resource expertise; high cost of ICT tools; and difficulties in getting the students ready, were the major challenges that higher institutes of learning had to battle with during COVID-19 global social distancing and schools lockdown.

4. Last of all, this paper also found that in order for educators to successfully deliver ICT-based learning, they need to be given technical, social, and moral assistance. This is supported by the World Bank (2020b) which stated that access to enough broadband, linked device at home, training and assistance are required for instructors who use ICT tools and technological applications.

Therefore, for everyone to benefit from the advantages of quality education through technologically-enhanced learning, the issues of standardized quality control, qualitative online resources, and tech-based learning need to be urgently addressed (Cojocariu, Lazar, Nedeff, & Lazar, 2014). Basically, tech-based learning involves concerted efforts and reasonable outlay. Dhawan (2020) avowed that a large investment is required to acquire the tools and equipment, maintain the equipment, educate the staff, and create the online content.

## 7. Conclusion and Recommendation

The emergence of COVID-19 pandemic has made it necessary to switch learning from the usual in-person mode to a technologically-enhanced mode. (Basilaiia *et al.*, 2020). The author of the present paper is not in doubt concerning the significant role ICT resources and technologies can play at a time like this. Accordingly, there is no gainsaying the fact that ICT tools and technological applications play significant roles in fostering smooth learning in this new age of technology, especially during emergency situations like the one created by the sudden advent of COVID-19 pandemic.

The COVID-19 crisis highlights both the shortcomings of the current system and the need to reconsider educational paradigms, particularly in the context of long-term integration of ICT tools. ICT tools and technological applications have successfully maintained educational continuity during the ongoing global state of emergency and have even demonstrated their benefits in other fields. Therefore, ICT tools and technological applications can be used in a variety of ways to simplify learning and other academic works. In light of this, Ahmed, Allaf, & Elghazaly, (2020) avowed that instructors and learners have continued to pour out praises on some tech-based teaching and learning techniques employed in education generally as a result of the COVID-19 pandemic, and they may continue to be used in the future.

Although, short-comings are recorded, meta-synthesis has clearly shown that the opportunities, benefits and advantages presented by ICT tools and technological applications to expedite learning during this critical time and even beyond, far outweigh

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the challenges. In essence, technology has advanced quickly, making ICT-based education very achievable.

For one thing, this is an exploratory paper. For another thing, exploratory studies are opened and subject to further research (Babin & Zikmund, 2015). The current study hereby recommends as follow:

1. Foremost, that government of nations and academic institutions globally take serious the issue of developing sustainable policies and regulations that will promote the use of ICT tools and technological applications to expedite learning across board to overcome the challenges brought about by COVID-19 adversity and any subsequent state of emergencies. Institutions and other stakeholders should make efforts to guarantee that all students and educational departments have access to the necessary resources. They are also to ensure that all the instructional apps are compatible with mobile phones because not all students have access to laptops.
2. Besides, part of the numerous lessons from the rapid onset of the COVID-19 pandemic is that learners need to be able to think critically, solve problems, and above all, be adaptable in order to survive the crisis. To prioritize the presence of these qualities in their learners, academic institutions are to strengthen their systems' resilience.
3. More recommendation from this study entails that proper arrangements are in place to provide adequate training for students and educators on the best ways to take full advantage of the numerous opportunities presented by ICT tools and technological applications in their various areas of studies, in the field of studies generally, and where possible other field of life to enable them prepare for better future.
4. In addition, provisions should be made for adequate ICT assistance in the form of infrastructure, tools, hardware, and software support systems in order to improve the delivery of effective learning, particularly at this period of COVID-19 global emergency. Educators should be given technical, social, and moral assistance. It is also essentially necessary to speed up the pace of technological advancement and maximize the technical implementation of online education programs.
5. Furthermore, added affordable gadgets should be created in order to give students access to offline digital learning resources, especially in those rural places. Also, academic institutions should seek to deliver learning experiences through a means of tele-courses to those in distant locations who are less privileged for them to have equal accessible learning opportunities. It is necessary to take action to bridge the digital divide.
6. More so, the unanticipated COVID-19 outbreak has given us the chance to reconsider and see a greater need for the adoption ICT tools and technology applications to manage learning. Education systems across the world need to keep up with the quick development of new technologies.



7. On a final note, even though lessons have been learnt by all stakeholders. There is possibility that some governments and academic institutions have learnt new or better lessons from the COVID-19 misfortunes, possibly because all countries are not affected with same intensity. Whatever is the case, this study recommends that lessons learnt from the unforeseen outbreak of COVID-19, should be put to good use and to help create new opportunities for the use of remote learning and blended learning approaches to meet the needs of the COVID-19 era and future learning needs.

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