

ASSESSING TECHNOLOGICAL INNOVATION ON EDUCATION IN THE WORLD OF CORONAVIRUS (COVID-19)

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ABSTRACT

Coronavirus (COVID-19) has become the most pressing virus that has affected the world negatively. This virus has brought many setbacks in all aspects of life including education. This study was conducted to find out how technological innovation has been introduced into education as the world is still battling with the COVID-19 pandemic. This study depended on primary and secondary sources of data. Wholly, the documents prepared by the International Labour Organisation captioned as ILO Sectoral Brief and United Nations Economic, Scientific, and Cultural Organisation (UNESCO) constituted major facts of this research. It was identified that indeed technological innovation has become very relevant as in E-learning. Another finding was that numerous developing countries are still encountering barriers in enjoying E-learning as internet connectivity is a major problem. It was recommended that Non-Governmental Organisations should avail themselves to improve the state of internet connectivity in most of the developing countries to enjoy E-learning. Adequate training and workshop should be organised to educate students and teachers on the usage of E-learning in the world.

Keywords: Technology, innovation. Technological innovation, education, and Coronavirus (COVID-19)

1. Introduction

Technology is the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment (Technology | Definition & Examples, 2020). Technology is the set of knowledge, skills, experience, and techniques through which humans change, transform, and use our environment to create tools, machines, products, and services that meet our needs and desires. Etymologically the word technology comes from the Greek **tekne** (technical, art, skill) and **logos** (knowledge) (What Is Technology - Technology Definition, 2020).

The origin of the technology dates back to the Stone Age when our ancestors discovered the existence in nature of a series of stone (silex, quartz, obsidian) extremely hard which could mold and sharpen it, this discovery with experience developed to sharpen allowed them to make the first knives, axes, and cutting tools which facilitated the work of hunting to ensure a daily food ration. In the previous example, we have seen humans transformed his surroundings selecting a stone and modifying it to create a tool by his skill and knowledge, allowing hunt animals more quickly and effectively. All objects around us in our daily lives are products of different technological advances that have developed over the centuries of our existence, we

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have transformed natural resources to make tools and machines that make our lives easier, satisfy our curiosity and desire to excel. Computers, tablets and smartphones, locomotives, cars and airplanes, the bulb and the microchip, the first man on the Moon and conquer of the space are milestones of our latest technology (What Is Technology - Technology Definition, 2020).

Innovation in its modern meaning is "a new idea, creative thoughts, and new imaginations in the form of device or method". Innovation is often also viewed as the application of better solutions that meet new requirements, unarticulated needs, or existing market needs. An innovation is something original and more effective and, as a consequence, new, that "breaks into" the market or society. Innovation is related to, but not the same as, invention, as innovation is more apt to involve the practical implementation of an invention to make a meaningful impact in the market or society. Innovation often manifests itself via the engineering process, when the problem being solved is of a technical or scientific nature (Bhasin, 2012).

Technological innovation is an extended concept of innovation. While innovation is a rather well-defined concept, it has a broad meaning to many people and especially numerous understanding in the academic and business world. Innovation refers to adding extra steps of developing new services and products in the marketplace or in the public that fulfill unaddressed needs or solve problems that were not in the past. Technological Innovation however focuses on the technological aspects of a product or service rather than covering the entire organization business model. It is important to clarify that Innovation is not only driven by technology (Editor3, 2013).

Technological innovation is the process where an organization (or a group of people working outside a structured organization) embarks on a journey where the importance of technology as a source of innovation has been identified as a critical success factor for increased market competitiveness. The wording "technological innovation" is preferred to "technology innovation". "Technology innovation" gives a sense of working on technology for the sake of technology. "Technological innovation" better reflects the business consideration of improving business value by working on technological aspects of the product or services. Moreover, in the vast majority of products and services, there is not one unique technology at the heart of the system. It is the combination, the integration, and interaction of different technologies that make the product or service successful. Technological innovations comprise new products and processes and significant technological changes in products and processes. Innovation has been implemented if it has been introduced in the market (product innovation) (Company, 2020).

Education is the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life. Again, Education is the act or process of imparting or acquiring particular knowledge or skills, as for a profession. (Definition of Education | Dictionary.Com, 2020). Educational methods include teaching, training, storytelling, discussion, and directed research. Education frequently takes place under the guidance of educators; however, learners can also educate themselves. Education can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. The methodology of teaching is called pedagogy. Formal education is commonly divided formally into such stages as preschool or kindergarten, primary school, secondary school, and then college, university, or apprenticeship.

Coronavirus which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China. It was initially reported to the World Health Organisation on December 31, 2019. On January 30, 2020, the World Health Organisation declared the COVID-19 outbreak a global health emergency. On March 11, 2020, the World Health Organisation declared COVID-19 a global pandemic.

Coronaviruses simply called **COVID-19** are a large group of viruses that are common among animals. In rare cases, they are what scientists call zoonotic, meaning they can be transmitted from animals to humans, according to the US Centers for Disease Control and Prevention. It is a dangerous disease with an incubation period between 4-6 days. It is fatal especially for those with a weakened immune system, the elderly, and the very young. It could also result in Pneumonia and bronchitis (About COVID-19 | Ghana, 2020).

Viruses can spread from human contact with animals and also from human to human. When it comes to human-to-human transmission of the viruses, often it happens when someone comes into contact with the infected person's secretions. The exposure factors are; a cough, sneeze, or handshake. The virus can also be transmitted by touching something an infected person has touched and then touching your mouth, nose, or eyes. Viruses can make people sick. Coronavirus symptoms include; fever, a runny nose, cough, sore throat, possibly a headache (About COVID-19 | Ghana, 2020). Responsibly, this study was conducted to find out how technological innovation has been introduced into education as the world is still battling with the COVID-19 pandemic.

2. Methods and data

This study depended on primary and secondary sources of data. The documents prepared by the International Labour Organisation captioned as ILO Sectoral Brief and United Nations Economic, Scientific, and Cultural Organisation (UNESCO) constituted a major fact of this research.

3. Coronavirus and Education

Teachers have had to adapt to a world of almost universal distance education as nearly 94 percent of all learners have faced school closures. Most teachers and their organizations have embraced this challenge, although in many developing countries teachers lack the skills and equipment to provide distance education effectively. As governments consider reopening the school as confinement measures are relaxed, the safety of learners and teachers should be paramount, and social distancing of learners, access to personal protective equipment, and regular virus testing will be key (COVID-19 and the Education Sector, 2020).

4. Technological innovation and Education in Coronavirus era

As of 13 April 2020, schools and universities have been closed in most countries around the world in an attempt to limit the spread of novel coronavirus disease (COVID-19). Nationwide closures have been mandated in 192 countries, interrupting learning for close to 1.58 billion learners (91.4 percent of total enrolled learners) and prompting almost all education systems to deploy distance learning solutions (UNESCO, 2020).

The disruption has also impacted the work of more than 63 million primary and secondary school teachers, as well as countless education support personnel. It has also affected early childhood education personnel, technical and vocational training personnel, and higher education teachers. While school closures can occur during times of armed conflict or in impoverished and rural regions, the global scale of the pandemic's disruption to education is unprecedented in terms of its reach, employment implications, and transformative nature. The exceptional nature of the current situation is also reflected in the remarkable rate at which technology and distance and virtual learning have been embraced to mitigate the impacts of school closures, as well as in the capacity of virtual strategies to tackle education challenges (ILO Sectoral Brief, 2020).

Teachers and schools have been creative in adopting a variety of technology-based strategies as alternatives to the traditional classroom, providing lessons through videoconferencing and online learning platforms and sharing learning materials and worksheets through school-based intranets and messaging platforms. In some countries, radio programmes, and national television are being used to broadcast school lessons and educational materials, particularly in

under-resourced areas that may be lacking in technological infrastructure (ILO Sectoral Brief, 2020).

While solutions to the disruption have been innovative and responsive, the reality remains that some schools and regions are better positioned than others to take advantage of resources, technological infrastructure, and the education technology market to respond to the crisis in more effective and comprehensive ways. The emphasis on virtual learning can exacerbate existing inequalities in education, particularly in developing contexts, marginalized communities, and rural settings, where access to technology and reliable Internet connections may be limited. Even within schools, inequalities such as those related to persons with disabilities or family income can hinder access to distance learning. Distance learning does not allow schools and teachers to carry out their important role in the socialization of learners and in the provision of social services, such as, for example, school meal programmes (WFP, 2020).

Successful application of virtual and distance learning before the COVID-19 crisis involved teachers being trained and students being technologically-equipped and have generally taken place in non-crisis situations. Under the circumstances of the COVID-19 pandemic, given the need to act quickly, the focus has primarily been on securing access to technology. Greater attention needs to be paid to how technology and learning may be effectively integrated, including the vital role of teachers in that regard, and the skills that students need for self-directed learning. Ensuring that quality learning continues in its newly adopted forms during the crisis requires that teachers have access to adequate resources and safe teaching environments and decent working conditions. In general, teachers and their organizations have been quick to adapt to the pandemic measures and have supported government efforts to implement distance learning. While a quick response on the part of governments and institutions is necessary to limit the spread of COVID-19, teachers and their representatives have not always been fully involved and consulted in response strategies. Their input is vital to ensuring education quality and maintaining the integrity of the profession. (ILO Sectoral Brief, 2020).

While most governments have closed schools and set up some sort of distance learning programmes for students, policy response on supporting teachers in this regard has been varied. According to the International Monetary Fund (IMF), almost all governments have increased spending on education. Much of this funding has been used in the deployment of online and distance teaching technologies, and there is little evidence that funding has gone towards teacher wages or training in the use of online technologies. Turning teaching materials into digital format at short notice has been a challenge as few teachers have strong digital and ICT skills (IMF, 2020).

In many countries in South-West Asia and sub-Saharan Africa, only about 20 percent of households have Internet connectivity, and few have personal computers. In Peru, 35 percent of teachers have access to a computer and Internet connectivity. The Peruvian Government, therefore, uses television and radio channels to provide classes and content to students, as well as online platforms such as *Aprendo en casa* (I learn at home). In Cameroon, it is estimated that 20–25 percent of teachers have Internet access and that the majority of teachers lack ICT skills. A national government task force was set up to establish the Protective Learning Routine, which enables teachers and learners to access education through platforms they are already familiar with, such as radio and television. In Uganda, teacher training institutions have been deployed to deliver capacity-building workshops for teachers without ICT skills (UNESCO, 2020).

In other countries, a more proactive approach has been taken with teachers' organizations. In Argentina, the Ministry of Education established a commission, comprising representatives of six teachers' associations, to plan the modalities of distance learning (Government of Argentina, 2020). In Los Angeles, the United States, the teachers' union (United Teachers Los

Angeles) reached an agreement with the Los Angeles Unified School District setting terms and conditions for teachers concerning online teaching and learning during the pandemic, including the flexibility to create their work schedules, discretion over teaching modalities, and protection from loss of pay or benefits during school closures. The agreement is expected to act as a model for other districts currently in negotiation. In Finland, the Trade Union of Education in Finland (OAJ) was consulted on emergency measures in education, which is supported (Trade Union of Education in Finland, 2020).

Companies and foundations have responded by releasing several tools aimed at promoting distance learning management systems, mobile technology learning systems, massive open online courses, self-directed learning content, collaboration platforms that support live video communication, tools that can be downloaded for offline learning, and tools for teachers to create digital learning content. The wide use of digital technologies, many of which are offered free of charge, has been appreciated by governments, many of which are deploying them as part of distance learning strategies (UNESCO, 2020). At the same time, this rapid spread of technologies in education has raised concerns about the penetration of commercial products into the public education market in many countries without passing through quality control and public procurement procedures (MarketWatch, 2020).

An ongoing study on digitalization and the teaching profession in five African countries, funded by the German Development Cooperation (GIZ), is yielding insights into how distance learning can work in developing countries and how technology can assist in responding to the COVID-19 pandemic (UNESCO, 2020).

5. Findings

- ✚ It was identified that indeed technological innovation has become very relevant as in E-learning.
- ✚ Another finding was that numerous developing countries are still encountering barriers in enjoying E-learning as internet connectivity is a major problem.

6. Recommendation

- ✚ It was recommended that Non-Governmental Organisations should avail themselves to improve the state of internet connectivity in most of the developing countries to benefit from E-learning.
- ✚ Adequate training and workshop should be organised to educate students and teachers on the usage of E-learning in the world.

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