

## Review Article

**Cite this article:** Vorvornator, L. (2026). Exploring the Impact of COVID-19 on Education: Creative Solutions to Real Challenges. *Educational Process: International Journal*, 24, e2026094. <https://doi.org/10.22521/edupij.2026.24.94>

**Received** July 5, 2025  
**Accepted** September 2, 2025

**Keywords:** Borderless classroom, COVID-19, face-to-face, disruption, teaching, learning.

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## Exploring the Impact of COVID-19 on Education: Creative Solutions to Real Challenges

Lawrence Vorvornator 

### Abstract

**Background/purpose.** The paper explores the impact of COVID-19 on education and focuses on challenges to the educational system and their solutions. COVID-19, which allegedly originated in Wuhan, China, had a devastating impact on human endeavours, the economy, and health. The education sector was not spared either. Schools were abruptly closed, and teaching and learning were suspended, which had far-reaching consequences for the economy and society.

**Materials/methods.** Grounded in the Social Cognitive Theory (SCT), the study adopted a literature review, otherwise known as a 'meta-study'.

**Results.** The study's findings reveal that the havoc wreaked by COVID-19 disrupted education and posed challenges to access to teaching and educational facilities, especially for rural students and the vulnerable in society. Traditional methods of face-to-face teaching became a thing of the past, and classrooms were borderless. Since the COVID-19 crisis and unparalleled educational disruption were far from over, virtual learning took centre stage and curricula were completed. Virtual teaching was being nurtured and was putting down its roots. Challenges such as network issues, frequent power supply interruptions, high data costs, and poor digital skills hindered access to e-lessons. I argue that, irrespective of challenges, virtual learning took place and curricula were completed. I recommend massive global infrastructure development so that teaching can take place anywhere and at any time, to address classroom limitations in the event of future pandemic outbreaks.

**Conclusion.** Teachers and students must undergo training to be abreast of digital skills for effective use of online tools.

## 1. Introduction

The study explores COVID-19, which is believed to have originated in Wuhan, China, and which served as the epicentre of a disaster that cut across the globe. COVID-19 was declared a pandemic in March 2020 (World Health Organization (WHO), 2020). The pandemic devastated all sectors of human endeavour and the global economy, such as the tourism industry, the production sector, and the health sector. The education and health sectors bore the brunt. Schools were abruptly and unexpectedly closed to curb the spread of the disease, since social gatherings like schooling were considered to be the pandemic's super-spreaders.

Grounded in the Social Cognitive Theory (SCT) propounded by Bandura (2023), the study employed a literature review, otherwise known as a 'meta study', to explore COVID-19's impact on education. What were the impacts of COVID-19 challenges on education, and how were those challenges handled to complete the academic year? This study differs from others in that it describes how a practical approach can be employed to address global challenges amid resource scarcity.

COVID-19 was declared a pandemic. To control or curb the spread of the pandemic, nations globally instituted restrictive measures such as social and physical distancing and stringent national lockdowns (Pham & Ho, 2020). These measures dealt a blow to social and economic activities, including the shutdown of museums, gyms, theatres, movie centres, casinos, swimming pools, and educational institutions (Sahu, 2020). The forced closure of basic, secondary, and tertiary institutions prompted authorities to find an alternative means to continue teaching and learning to complete the academic year. As a result, educational institutions adopted e-lessons to replace orthodox face-to-face learning (Ratten, 2020). However, there were challenges around the introduction of the online learning approaches employed to complete the academic year.

The paper's rationale is to confirm that, despite COVID-19's global challenges to the education system, solutions were found even with scarce resources. The paper submits that, regardless of challenges, with the appropriate interaction of the environment, solutions can be found. COVID-19 was a pandemic and devastated every sector, but with the adoption of SCT, online teaching and learning were introduced. This led to the academic year being completed despite teaching and learning being severely disrupted by the COVID-19 pandemic.

The study is structured as follows. The theoretical framework explores the social cognitive theory (SCT). I then proceed to a literature review that presents arguments and discourse on the COVID-19 pandemic, and thereafter to the study's methodology. Then follow the study's research findings, conclusion, and recommendations. The next section presents the study's theoretical framework.

## 2. Theoretical Framework

The study is grounded in the Social Cognitive Theory (SCT) as propounded by Bandura (2023). SCT asserts that learning occurs through interaction with people and the environment, and through the use of devices (Bandura, 2023). Vinney (2019) concurs that SCT can be applied to any social behaviour change aimed at influencing new lifestyles and inculcating skills in people through communication within any system.

The SCT asserts that people learn through interaction, observing others' behaviours and actions, rehearsing, and comparing their standards with others'. Moreover, John Dewey's theory, cited in Williams (2017), also supports Bandura's (2023) principles of learning through SCT. Dewey avers that interaction with the environment shapes and formulates individuals' beliefs and decision-making. Not only does the SCT explain interaction, but it also demonstrates how individuals overcome challenges and succeed in the face of adverse situations and calamities such as the COVID-19 pandemic (Bandura, 2023). The SCT provides a clear understanding of the COVID-19 pandemic's impact on

education and the introduction of virtual teaching and learning to complete the curricula. This explains the adaptation to challenges at specific times to provide solutions. Hence, the SCT supports individuals in adopting problem-solving skills and becoming more flexible and dynamic rather than rigid. The next section presents the study's literature review.

### 3. Literature Review

Arguments and discourse in the literature reveal that the COVID-19 pandemic's impact on the educational system led to the unexpected closure of schools and universities to prevent physical contact and enable social distancing (Prokopenko & Berezhna, 2020). Almost all social gatherings, as well as physical contact activities, were cancelled or postponed. Among them were graduation ceremonies, seminars, conferences, workshops, and sporting activities both intra- and inter-universities (Prokopenko & Berezhna, 2020). University community members, such as staff and academics, were instructed to work from home to avoid violating COVID-19 rules and regulations (Aucejo et al., 2020).

Some of the educational institutions were dealt a massive blow when their members were infected with the virus. Large sums of money were spent on purchasing cleaning and disinfecting materials to disinfect the entire premises and curb the spread of the deadly virus (Crawford et al., 2020). As a result, the budget allocated for educational materials was diverted to cover cleaning activities, curtailing teaching and learning. Not only that, but personal protective equipment (PPE) such as masks, gloves, foot and eye protection, and full body suits became 'hot commodities' with exorbitant prices (Liguori & Winkler, 2020).

#### 3.1. Introduction of Borderless Classrooms

The response to the need to complete the academic calendar across the globe was the introduction of borderless classrooms or e-learning, also known as online learning, to avert the catastrophic and devastating impacts of the COVID-19 pandemic on the closure of schools (Vorvornator, 2024; Daniel, 2020; Marinoni *et al.*, 2020). On 17 February 2020, New York University Shanghai announced its readiness to halt face-to-face teaching and move on to online learning (Marinoni et al., 2020).

Within a few days, Duke Kunshan University and Zhejiang University migrated from traditional teaching and learning to online learning. Many other universities followed suit, among them Peking University and Tsinghua University. Shanghai Jiao Tong University was not left out of the transition, and on 1 March 2020, they transmitted their first lectures online (Leung & Sharma, 2020). However, despite these effective measures and the remarkable success chalked up by e-learning, and its timely intervention in saving the academic calendar from disruption by the global pandemic, there were numerous challenges during the introduction and operational stages of the online learning initiative.

Among them were a lack of resources, frequent interruptions, connectivity issues, expensive data costs, and academics and students struggled to adjust. Not only that, but the physical space and environment were not conducive to the students. Mental and health-related issues inflicted by the pandemic, and the inadequate meeting of basic needs and wants, were also identified.

#### 3.2. Challenges Faced in Introducing E-learning in The Midst of the COVID-19 Pandemic

First and foremost was the agony of academics. COVID-19's massive disruption took everyone by surprise. The academics were no exception. With the introduction of online learning, which replaced traditional face-to-face methods, ordinary academics lacking technical skills struggled to adapt to e-learning (Chen et al., 2020; Wang et al., 2020). Further studies revealed that some

academics were novices in information technology and had no knowledge of online teaching and learning (Chen et al., 2020).

In short, the academics' understanding of the technology was poor, if not appalling, and as a result, they struggled to deliver effective e-lessons. Digging deeper, the challenges the academics battled with ranged from the arrangement of the online classes, monitoring of the effectiveness of online teaching, and how to implement the teaching methodology according to the plan, to the type of online platforms such as Zoom, Skype, and Microsoft team to choose to give the best results for the recipients (learners) (Teras et al., 2020; Goh & Sandars, 2020). Sahu (2020) further reveals that conducting tests and assessments in e-learning was a daunting task for academics and faculty staff, especially in monitoring and preventing examination malpractice among students.

Not only did the academics battle to adjust, but the students had their share of problems too. Dewadi et al. (2020) point out that online learning is appropriate and conducive only for upper- and middle-income households. They further noted that low-income household students were denied lessons due to low connectivity. They also maintained that in Nepal, online teaching and learning widened the existing gap between citizens and nationals from low-, middle-, and upper-income countries. In another development, Radha et al. (2020) posited that online learning cannot be effective for all subjects.

Dewadi et al. (2020) opine that using 'one broom to sweep' all the subjects is inappropriate, ineffective, and unacceptable. This implies that the humanities (Geography, History, and Economics) and sciences (Physics, Life Sciences, and Agricultural Sciences) cannot be taught online using the same approach. They postulate that subjects such as Science, Technology, Engineering, and Maths, popularly called STEM, require more hands-on, experimental teaching than online teaching alone.

### ***3.3. Acclimatization of Students During Online Teaching in the Pandemic***

Further, the students' acclimatisation during online teaching also reared its ugly head. Ronnie et al. (2020) observed that students found it difficult to adjust to online teaching. They further noted challenges posed by the students' numerous responsibilities and roles at home, as well as poor communication and frequent interruptions between students and lecturers. O'Keefe (2020) further elaborates that during the lecture, technical problems arose, but the students did not have assistance in solving them.

Moreover, access to digital devices such as laptops, tablets, and sophisticated smartphones were barriers for some of the students too. With regard to the inability to acquire digital devices, a study by Kapasia et al. (2020) noted that in West Bengal, India, 30.6% of students who were from poor households could not afford devices like laptops and tablets, and were using their textbooks as learning resources, instead of joining the online learning. Despite their desire and willingness to participate in online learning, they were denied, through what I term as 'have not' or the inability to purchase digital devices. This, to some extent, explains an African adage that holds that 'if wishes were horses, beggars would ride'. The circumstances in West Bengal mirrored the earlier assertion by Dewadi et al. (2020) in Nepal that online teaching and learning deepen and widen inequality gaps between the rich and the poor.

### ***3.4. Challenges Led to Abolishment of Online Teaching and Learning after the Introduction***

To counter the aforementioned problems discussed in the previous section above, the Commission on Higher Education (CHED) in the Philippines was scrapped, and online teaching and learning were abolished after it was introduced for three days, with the explanation that the Philippines was not ready to implement online teaching and learning (Dewadi et al., 2020). Networks,

connectivity, and internet-related issues were identified as another challenge. Changes always come with a cost; such costs can be positive or negative.

In short, migration from orthodox face-to-face teaching and learning to online teaching requires fast and reliable internet connections. In that regard, when facilities and infrastructural development elude communities or the country as a whole, achieving the goals of e-learning becomes an illusion, if not impossible. Researchers such as Aboagye et al. (2020) identified connectivity problems as the major hindrances to e-learning during the stringent lockdown due to the deadly pandemic. Ronnie et al. (2020) concur and, in comparing barriers to online teaching and learning, indicate that the unavailability of fast internet connections poses many more problems than ownership of digital devices or technical glitches.

In other studies, the major reason for students' non-participation in online studies was also attributed to connectivity problems (Mamun et al., 2020; Naciri, 2020). However, Dumuyakor (2020) observed that the main drawback of Ghanaian international students in China, not being able to access the internet, was not about connectivity problems, but rather the exorbitant cost of data bundles. Hardware and software unavailability was also identified by Crawford et al. (2020) as a challenge to students' access to online teaching and learning.

To clarify issues concerning the connectivity problem, Crawford et al. (2020) asserted that the network problem might not be a global issue but rather affect only developing countries and certain cross-sections of developed nations. Crawford et al. (2020) clearly explain the infrastructure gaps between developing and developed countries. Confirming the importance of network connectivity, a study by Chang and Fang (2020) found that over 70% of academics agreed that 'network speed and stability were poor', posing major challenges for effective e-learning.

### ***3.5. Adoption of Effective E-teaching and Learning Systems***

To ensure effective e-teaching and learning as new measures to replace traditional face-to-face styles, there must be infrastructural development, affordable data bundles, and digital devices such as laptops, tablets, and smartphones distributed to academics and students. Furthermore, challenges related to accommodation, physical space, and a conducive environment for students to participate in e-lessons were also highlighted (Ronnie et al., 2020).

Ronnie et al. (2020) further point out that students from poor households find it difficult to create conducive, serene, and peaceful environments in their homes to participate in e-learning. Ronnie et al. (2020) maintain that some students who did not have private rooms rushed to the toilets and washrooms to receive calls from their teachers so as not to be disturbed. Research by Chang and Fang (2020) revealed that out of 232 participants, a large number, 103 (44.4%), confirmed that they did not have a conducive environment for studying. Only just above the average of 129 students (55.6%) claimed to have decent accommodation conducive to studies. This painted a gloomy picture of the level of schoolwork, their performance, and students' productivity while at home. It is therefore important for the various institutions to consider the physical conduciveness and serenity of the students, but this factor was overlooked before the introduction of e-learning (Daniel, 2020).

### ***3.6. Challenges of Mental Health-Related Problems Such as Stress, Anxiety, and Depression Identified Among the Students***

Rossi et al. (2020) and Xiong et al. (2020) highlighted the anxieties and stress among students caused by the sudden closure of schools and the shift from traditional face-to-face learning to online studies due to the pandemic. Moreover, students whose relatives or parents suffered from the pandemic could not concentrate on their studies as a result of depression and anxiety (Dorn, 2020). Especially, those whose parents died or lost their jobs due to the pandemic were more depressed and found it difficult to concentrate on e-learning. Zolotov et al. (2020) found that the COVID-19

pandemic created massive fears and mental health-related problems among university students in Israel. To overcome the mental problem and the psychological effects, the students resorted to the use and abuse of drugs as a coping mechanism. The coping mechanisms adopted had negative impacts on e-learning and its level of productivity.

### ***3.7. Anxieties and Stresses Induced by the COVID-19 Pandemic***

Studies revealed that Chinese students were not spared from the anxieties and stresses induced by the COVID-19 pandemic (Pragalapati, 2020). Pragalapati's study discovered that 24.9 % of Chinese students suffered from mental health-related issues. Anxiety and stress levels of the students were associated with the loss of relatives and family members and the livelihoods of the households (Pragalapati, 2020). The effects of livelihoods are inseparable from education. This implies that students from low-income backgrounds who cannot meet basic needs and wants, such as food, shelter, and clothing, find it difficult to take e-learning seriously.

Ronnie et al. (2020) further pointed out that poor households with students who lack necessities such as clean water, electricity, basic health care, and security find it difficult for their students to concentrate on their studies at home. The poor household students' participation in e-teaching and learning was 'partially', meaning their bodies were with the devices, but their souls or minds were far away because they were thinking about what to eat after the lesson. Literally, to some extent, it can be said to be comparable to the half-baking of cakes.

Ronnie et al.'s (2020) research found that students living elsewhere rather than at home faced challenges related to finances (26.5%), food (51%), and health (22.5%). The researchers noted that these students lived in places other than with their relatives, such as rented houses and guesthouses. Furthermore, the lack of resources for both academics and students to deliver effective online teaching and learning was revealed. Kerres' (2020) research revealed that some universities lacked basic amenities, such as communication tools and kits, as well as the skills needed to migrate from orthodox face-to-face teaching to e-learning.

Kerres (2020) found that some universities simply followed their sister universities because it was the order of the day. In other words, there were no options or alternatives to continue academic work other than online studies. In that regard, some universities were unable to assess their strengths and weaknesses (human and physical capital) before embarking on e-learning. Kerres (2020) asserted that few universities provided students with online access to materials before the COVID-19 pandemic.

Such challenges hampered online teaching and learning, hindering institutions' success in using e-lessons. Moreover, the low-speed broadband hampered the online delivery of lectures (Azorin, 2020). At the same time, the fact that academics were asked to work from home without measures in place to upgrade infrastructure and resources posed challenges to the effective and efficient delivery of e-lectures. It was not only the academics who were struggling; parents also needed to find additional funds to purchase computers and information technology equipment for their wards' e-learning.

All of this posed a threat and a burden to the parents, who struggled during the economic lockdown (Garde et al., 2020). As mentioned earlier, in rural areas where there was no electricity connectivity to the national grid, charging laptops and tablets was a daunting task for students (Sarwar et al., 2020). In a nutshell, some higher institutions were able to deliver effective e-learning due to infrastructure development, whereas others were unable to do so due to a lack of amenities. In other words, the capacities of both human and physical capital, as well as the availability of resources, differ from one institution to another, and hence they affect the standard of education.

## 4. Methodology

This study employed a literature review (LR) to explore the impact of COVID-19 on education. Taherdoost (2022, p. 11) indicates that LR is 'the process of accessing published secondary data'. The definition explains two different characteristics.

### 4.1. Research Design

Information from existing sources was used in this exploration, and these sources included books, articles, journals, and organizational and non-organizational reports (Maxwell, 2021). Taherdoost's second definition notes that LR is desktop research. This implies that the study was not conducted in the field (Taherdoost, 2022). Another way to define this study is a "meta study" because it reviews, assembles, and arranges the information presented in previous studies in a coherent way.

### 4.2. Data Collection Procedures

Search engines, namely Google Scholar, JSTOR, Research Gate, EBSCOhost, and Scopus, were consulted for this study. Health and education websites and journals, including the Health Education Journal (HEJ) and the Health Education Research (HER), were consulted. Further, search terms, namely 'Borderless classroom', 'COVID-19', 'face-to-face', 'disruption', and 'teaching and learning', were employed. The search engines and terms covered the period from August 2024 to the end of April 2025, meaning that search engine activities lasted for nine months.

The study acquired 1,535 ideal publications, of which 1,526 were derived from an electronic search, and eleven were found through forward and back searches. Eligibility assessment was conducted, and a total of 49 articles were selected for the write-up, cited and referenced through the following eligibility criteria: a) article publications concentrate on either or both COVID-19 and education; b) article publications focus on educational challenges and solutions; c) article publications date from 2016 or later, and d) article publications are in English. Nine years was chosen as an appropriate period to limit the scope of this study because it was a time which also saw unprecedented health outbreaks such as Ebola, as well as the COVID-19 pandemic.

### 4.3. Instruments Employed

Templier and Paré (2015) indicate six steps in examining LR: a) identifying primary research objectives and questions; b) screening the relevant articles; c) making inclusions; d) exploring article quality and content; e) extracting data; f) analysing data. All articles found irrelevant were excluded. After an eligibility check, I proceeded to the data extraction and analysis stage. Data extraction deals with coding ideal articles through thematic analysis related to the study. Thematic analysis is defined as the process of identifying, analysing, assembling, and reporting patterns within qualitative information (Creswell, 2013). I adopted 'framework analysis', which deals with methodological steps and procedures. I then analysed and extracted the important literature. The framework provides the guiding process and procedure which facilitate both analysing and extracting relevant data. This process helps researchers to analyse large datasets, manage data, identify processes, patterns and draw conclusions. The process is described by Armstrong (2021) as 'sifting, charting and sorting materials according to key themes and issues'. Familiarisation is done in order to have real knowledge about the articles' importance. Thereafter, I identified the thematic framework centring on theories and concepts that emerged from readings on the COVID-19 impacts on education. Indexing is done through sifting the data related to specific themes; charting the information is done to find out important headings and subheadings during the thematic framework stage (Creswell, 2024). These were the procedures that I followed. Mapping and interpretation—which entails gathering and analysing all the criteria features of the dataset, and a synthesis of information was performed.

#### 4.4. Analytical Techniques

Several articles selected for the study adopted a range of qualitative and quantitative methodologies. Meta-analysis for the quantitative data was ignored because this research method was different. This means that this research did not share common variables with a quantitative methodology. Textual information was coded, mapped, and presented accordingly by adopting a framework-analysis approach. The LR, theories and concepts adopted here present a broad picture, one that forms baseline information and data and helps in the understanding of the existing literature on COVID-19 impacts on education: creative solutions to real challenges (Maxwell, 2021). The LR on COVID-19 impacts on education: creative solutions to real challenges has helped to avoid the duplication of existing works by other scholars. However, there are limitations to this method. For example, since not all academic search engines were adopted, there could be some existing literature that was left out. Figure 1 below shows the article selection procedure.

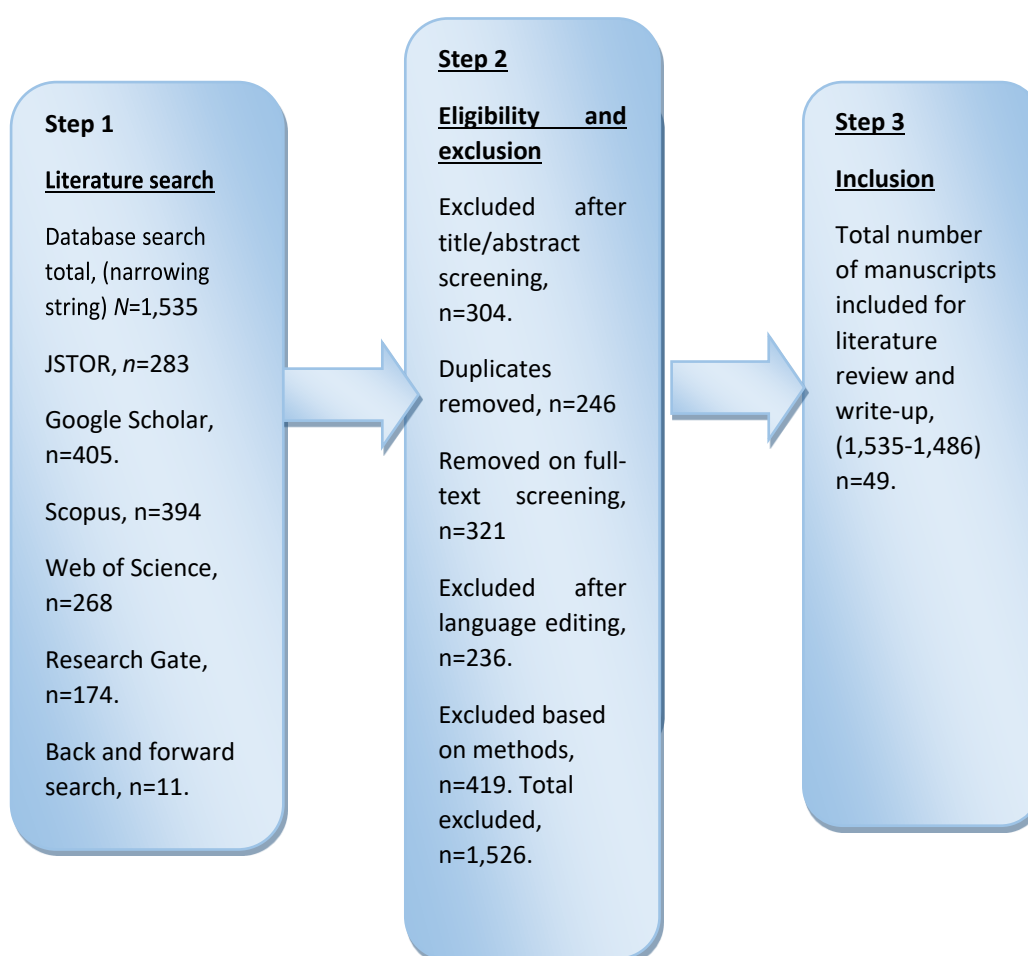


Figure 1. Literature Selection Procedure.

#### 5. Findings

The introduction of virtual teaching and learning to complete the curricula posed many challenges regarding human and financial resources. Neither academics nor students were psychologically and mentally prepared, and this affected lesson delivery. Students struggled to connect to studies online due to a lack of skills and internet connectivity (Dewadi et al., 2020). The STEM subjects were taught as theory subjects instead of practical subjects (Radha et al., 2020; Dewadi et al., 2020). This exposed the infrastructural deficit gaps in many nations. Students who were not coping and those relations who suffered from the pandemic developed mental health-related

problems such as loss of concentration, anxiety, stress and depression (Rossi et al., 2020; Xiong et al., 2020). Physical space was a challenge, and toilets were employed as convenient places to engage in e-teaching and learning (Xiong et al., 2020).

Chang and Fang (2020) also identified that laying workers off affected households' financial ability to afford data bundles and computers for students. The poor households were most affected, and it widened the inequality gap between the rich and the poor. Economically, food prices increased since most industries were shut down (Dumuyakor, 2020), apart from the agricultural sector, which witnessed an increase in productivity (Crawford et al., 2020).

Socially, an embargo was laid on social gatherings such as schooling, religious activities, and entertainment centres. Citizens were asked to observe social and physical distance (Prokopenko & Berezhna, 2020). This confined citizens to their immediate environments, and solitude and the nuclear family were observed (Aucejo et al., 2020). The confinement in some instances led to boredom and domestic violence (Korsi & Mdiniso, 2021). However, others used the period to strengthen family ties. The political structure was also changed to contend with COVID-19. New rules made during the pandemic era were called the 'new normal'. Security services were deployed to ensure citizens obey the new normal.

I argue that despite the COVID-19 challenges, which looked as if they were going to destroy the academic calendar, the SCT was employed to overcome these challenges. This led to the completion of the academic year, hence real challenges and real solutions.

## 6. Discussion

The SCT theory is usually adopted to solve challenges such as educational, financial, economic, social, political and health (Bandura, 2023). The SCT is explored by interacting in the environment to identify the materials and methods that can be applied to particular challenges. During the challenges posed by the COVID-19 pandemic, where all sectors of the economy were affected, the educational system was required to devise means that were appropriate to overcome such challenges (Rossi et al., 2020). Due to that, distance education was introduced to ensure curricula completion. The process is similar to the findings of Kerres (2020) in China, where virtual education was introduced to complete the academic year. With regard to finances, people adjusted their daily expenses to be able to afford basic goods, since many workers were forced to stay at home, except for the emergency and health workers. This finding is not different from that of Ronnie et al. (2020). The financial challenges during the COVID-19 pandemic determined the demand and the supply of industries (Garde et al., 2020).

Most households were not able to afford a data and a computer for their wards. Citizens adjusted their demand by buying fewer goods. This exemplifies the application of SCT by consumers and suppliers during pandemics. The suppliers supplied less because the demand for goods and services was low.

Further, through the SCT, COVID-19 challenges were studied, and it was realised that socialisation leads to the spread of the pandemic. In this regard, measures were implemented, such as social and physical distancing. This ensured that the spread of COVID-19 was curbed, unlike in the early stages (WHO, 2020). However, there were memes and videos that citizens used as a substitute for socialisation in their immediate confinement (Pragalapati, 2020). Again, to ensure that physical and social distances were observed, the SCT informed the authorities to constitute political structures which ensured that rules and regulations were obeyed. These political structures implemented the rules and regulations (physical and social distances), which ensured citizen compliance with the new normal. On the health front, the environment was explored to find solutions to the pandemic. This involved laboratory and traditional medications before a cure was found for the pandemic. The

difficulty in finding medication in the initial stages of the pandemic made citizens design herbs and display them on social media platforms as a cure (WHO, 2020).

Overall, the SCT was adopted to ensure the effective interaction of society and environment, which allowed individuals to understand the COVID-19's real challenges. Hence, the environment was interacted with and available resources or devices were explored to find solutions to overcome COVID-19 challenges. I confirm that challenges can be solved with the immediate resources within our reach, just as the COVID-19 pandemic's imminent disruption of the educational system was tackled through the borderless classroom to complete the academic year.

## 7. Conclusion

The advent of the COVID-19 pandemic wreaked havoc on human endeavours; all sectors of the economy were closed, and the health sector was dealt a massive blow. As a result, schools were abruptly closed down. All activities on campuses were cancelled or postponed; physical, as well as social contacts, became things of the past. Traditional face-to-face teaching was abolished to observe the COVID-19 rules and regulations. To avoid disruption of the academic calendar, online teaching and learning were introduced.

Despite its having chalked up many successes, online education experienced different forms of challenges, among them being ill-preparedness of both academics and students and connectivity of networks (which were regarded as the major hindrances to online teaching and learning), lack of resources, as well as the basic needs and wants of the learners.

Furthermore, the lack of a conducive environment for studies and basic resources for some of the universities was identified. Overall, the study reveals that online learning, to some extent, was successful, and despite the challenges, it has helped to reach learners at a time convenient for them.

## 8. Suggestions

The paper, therefore, recommends that for effective and efficient e-learning infrastructure development must be the hallmark of the various governments across the globe, especially in developing countries. Further, skill development for both academics and students, so far as e-teaching and learning are concerned, should be a basic requirement.

Institutions should also endeavour to provide basic equipment for the learners, especially those from poor backgrounds. Moreover, appeals can be made to organisations and companies to extend their corporate social responsibilities (CSR) to the students because they are the ones who will form the future labour force of the state.

Despite the fact that the COVID-19 pandemic has subsided, there is a need for continuous professional development in terms of equipping teachers with e-teaching and learning skills, to avoid any future challenges in case there is another pandemic outbreak.

There is a need to set aside emergency education funds to avoid situations where educational budgets are constrained for e-teaching and learning purposes during another pandemic outbreak.

Donors should prioritise aid toward education to financially support and harmonise the government's plans to equip teachers in e-teaching and learning now to avoid emergency measures during another pandemic outbreak.

## Declarations

**Author Contributions.** (Vorvornator L.K.: Conceptualisation, original manuscript preparation, data analysis and literature review, reviewing, editing, and writing the methodology. The author has read and approved the final version of the article.

**Conflicts of Interest.** The author declares no conflict of interest.

**Funding.** No funding was received for writing this manuscript.

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