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Online Learning as an Alternative Learning Modality in Ecuador's Education Institutions Amidst Crises and Outbreaks: A SWOT Analysis

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Abstract: The primary objective of this paper is to analyse the weaknesses, threats, strengths, and opportunities (SWOT matrix analysis) of online teaching and learning in educational institutions (primary, secondary, and higher education) in Ecuador during the COVID-19 pandemic. A qualitative study of the descriptive documentary type was conducted, where the information obtained from virtual education in times of crisis and outbreaks was collected and analysed. It was found that educational centers at different levels of schooling still continued to use traditional teaching methods and processes subject to old procedures as a basis for their incursion into virtuality, although other establishments began to handle combined modalities such as blended and hybrid online (e-learning) modes of learning. In conclusion, the deadly coronavirus disease (SARS-COV-2) abruptly halted much human activity worldwide. This forced hesitant educational systems that still used traditional face-to-face teaching methods in classrooms to move and change to online learning in many regions, regardless of the socioeconomic level and demographics of the students. Aside from determining how to deal with the problems and challenges of virtual education during epidemics and natural disasters, it is clear that the number of technology-driven educational start-ups has increased significantly.

Keywords: COVID-19 pandemic, educational technology, e-learning, teaching method, virtual education.

Introduction

The SARS-CoV-2 outbreak is one of the reasons why the global economy was temporarily stagnant, affecting all sectors of manufacturing, industry, tourism, education and others. With the outbreak of the pandemic, companies, organisations, and academic establishments, both public and private, in most countries on different continents around the world were forced to close permanently and/or temporarily. Schools, colleges, and universities in urban and rural areas were affected by the lack of classroom teaching and learning activities that were maintained within the classrooms, so there was a fear of losing the school year or semester in which they were studying, and it remains a question mark for the future. The impact of the coronavirus on education affected more than 87% of the world's student population; 1,520 million students and 60.2 million teachers were no longer in the classroom (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020).

During epidemics, masks, hand washing, and social distancing between people were transcendental, but this limited learning opportunities. Despite the COVID-19 health crisis, government officials and training centers advised educational institutions to continue academic activities (Rezapour-Nasrabad, 2020). To protect teachers, students, communities, and society, a scenario plan had to be developed

and implemented (Rieley, 2018). This long-term stability necessitated environmental adaptability. Because of the rise in coronavirus disease, online training was regarded as a panacea (Dhawan, 2020). It can be scheduled to accommodate the students' schedules. It is accessible 24 hours a day, seven days a week, from any location. Traditional education requires more investment to reach the most remote and rural areas, whereas online education does not. By combining technology and classroom instruction, blended learning can help students improve their knowledge and skills.

Currently, the world is globalised, and online education would greatly help students to have greater access. Many don't and have to leave education due to the long distances that they walk for hours to reach their educational center. Without virtual learning, in times of a pandemic, all students would be delayed by at least one school year. It is recommended to continue implementing online teaching from the first levels, such as primary and secondary, and prepare the entire educational community for future crises such as pandemics, war, hurricanes, earthquakes, and other disasters.

E-Learning and Online Learning

Technological advancements have facilitated the emergence of e-learning, or web-based training, which has numerous advantages over traditional, face-to-face sessions and certain critical variables (Cabero, 2006). The online (e-learning) modality has the advantage of facilitating students' distance education through the use of virtual platforms with freedom of time, place, pace, and any medium or device connected to cyberspace (Cojocariu et al., 2014; McBrien et al., 2009).

Online learning can be defined in a variety of ways. It can be defined as learning experiences in synchronous or asynchronous environments using a variety of computing devices (e.g., cell phones, laptops) with an internet connection. Students can be anywhere (independent) in these spaces to learn and engage with instructors and other students (Singh & Thurman, 2019). The synchronous environment's structure enables learners to participate in live remote lectures, real-time collaboration among classroom participants, instant feedback, and increased social engagement; in contrast, live remote lectures and immediate feedback are not possible in the asynchronous mode (Scheiderer, 2021). E-learning makes use of specific virtual platforms that include basic and essential features for interactivity, flexibility, scalability, and standardisation. It also offers functionalities such as integration, gamification, automated assessment, multi-channeling, cloud content, tracking and reporting, and the virtual classroom (Barquero, 2020), as well as a graphic interface design that is adaptable for laptop, tablet, and mobile devices. This educational software also includes tools for audio and video recording.

The Need to Migrate to the Online Modality

The severe global pandemic caused inhabitants to enter a stage of quarantine never seen before, turning towns, regions, or metropolises into non-mobile cities (Global Voices, 2020), and its effects could also be felt in schools, colleges, and universities. Due to this, online learning is gaining strength and is considered a remedy, necessity, or unique solution to the crisis that made academic centers migrate from offline to online mode in a short period. Many institutions that were resistant to change were forced to make the transition and accept the new technologies for education (Oyedotun, 2020). Disasters like this one show the other side of online teaching, which appears to be those big technology companies making money by making people learn online.

Understanding the urgency of the current situation, educational institutions must seek the most appropriate alternatives and innovative solutions to help resolve the critical circumstances (Liguori & Winkler, 2020). Because there are a large number of students from all parts or regions of the world in the online modality, and they interact at any time, these corresponding alternatives will function at the same time using technological tools that completely digitise the processes (Alvarez, Jr., 2020). From one moment to another, normal classrooms disappeared and became digital classrooms. Teachers also changed their pedagogical approaches to cope with the chaos and adapt to the new scenario. At this stage, the quality of education was crucial. With migration, there was a huge challenge to maintain the recruitment of students, sustain the labor market, and move local economies (Watermeyer et al., 2021). Not everyone has the same conditions and capabilities to transform curricula into virtual resources overnight. And there is still concern about how schools will be able to accommodate e-learning due to the abrupt mass transfer of students due to the coronavirus (Carey, 2020). Their reputation for preserving the quality of education is at stake.

Associated Problems and Possible Solutions

Many educational technologies are available online, some of which are free and others which are not. They are not immune to human error, natural disasters, or system or software errors such as viruses. They are also susceptible to computer flaws and threats that endanger institutional or commercial data (Ambit BST, 2020). Students do not manage their time well, despite the fact that online teaching is flexible in terms of time and place. Students will not be able to fully develop unless they apply what they have learned in theory. In some courses, students are not permitted to practice. Technical issues, a lack of community support, time constraints, and difficulty understanding course objectives all impede online training (Song et al., 2004). Another study discovered that students were unprepared for e-learning because of family, work, and social responsibilities. Students also had difficulty adjusting to new technologies (Parkes et al., 2015). The responses of the teachers revealed a lack of training in Learning Management Systems.

With e-learning, there is always a solution. To avoid technical difficulties in virtual classrooms, lessons can be pre-recorded on video, content checked, and other reliable alternatives prepared. Teachers must set time limits, schedule activities, and provide individual attention to students in order to create dynamic, engaging, and interesting courses for them. Audio, video tutorials, video calls, and social media group forums can help when text communication is difficult. Students can practice and perfect their skills with the best online programs, while teachers can create web-based courses that encourage active and critical reflection, constructive feedback, inquiry-based learning, and early learning effectiveness (Keeton, 2004), and support each student's challenges and adaptations (Partlow & Gibbs, 2003). It is also critical to create courses that assist disabled students in succeeding online (Thompson & Copeland, 2020).

Objectives

The primary objective of this study was to examine the emergence of educational technology start-ups (EdTech Start-ups) for online learning by conducting a SWOT analysis of e-learning during natural disasters and crises such as the COVID-19 pandemic. Additionally, this study intended to provide some valuable feedback and directions regarding how to improve the web-based or online (e-learning) teaching-learning mode during challenging and difficult economic times.

Methods

Research Design

The study employed a descriptive-documentary technique combined with a qualitative research method to gain an understanding of the social condition through the use of theoretical bodies acknowledged by the scientific community (Bravo et al., 2022; Torres, 2010). The purpose of this paper was to investigate the reality of online learning during times of crisis and pandemics, such as the case of the coronavirus in Ecuador. It also intended to identify the problems associated with virtual education and to offer possible solutions, suggestions, and recommendations based on previous research on the subject to be successful in the confinement teaching mode.

Procedure

Data were gathered using a descriptive-documentary technique and a SWOT analysis to investigate the reality of online learning during times of crisis and pandemics in order to identify the problems associated with virtual education and offer possible interventions as shown in Table 1. According to Grewal et al. (2018), to address topics relevant to review papers, research should have been conducted over the past two years, focusing on increasing the prevalence of review papers. Thus, articles were selected from 2019 up to 2021 to be reliable and valid. Only one (1) secondary source dated from 2018 was used as a supplementary material.

Table 1: Reliability and Validity of Secondary Sources Used in the SWOT Analysis

SWOT Analysis Part	Author/s and Year	Title	Type of Secondary Source	Remarks
Strengths	Forero et al., 2019	Organisation of a course in virtual classrooms: Strengths and weaknesses for learning.	Research Article	Reliable and Valid
	Agbele and Oyelade, 2020	Impact of COVID-19 on the Nigerian educational system: Strengths and challenges of online/virtual education.	Research Article	Reliable and Valid
	Atienza and Tabuena, 2021	The impact of COVID-19 pandemic on managerial accounting and its adjustments in financial markets.	Research Article	Reliable and Valid
Weaknesses	Favale et al., 2020	Campus traffic and e-Learning during COVID-19 pandemic.	Research Article	Reliable and Valid
	Aretio, 2021	COVID-19 and digital distance education: pre-confinement, confinement and post-confinement.	Research Article	Reliable and Valid
	Constante, 2020	Ecuador: online education from home is impossible and unfair.	Website	Reliable and Valid
Opportunities	Adedoyin and Soykan, 2020	COVID-19 pandemic and online learning: the challenges and opportunities.	Research Article	Reliable and Valid
	Jordan et al., 2021	Education during the COVID-19: crisis opportunities and constraints of using EdTech in low-income countries.	Research Article	Reliable and Valid

Threats	Vivanco-Saraguro, 2020	Tele-education in times of COVID-19: inequality gaps.	Research Article	Reliable and Valid
	Hillier, 2018	Bridging the digital divide with off-line e-learning.	Research Article	Supplementary Material
	Affouneh et al., 2020	Designing quality e-learning environments for emergency remote teaching in coronavirus crisis.	Research Article	Reliable and Valid
	Hamid et al., 2020	Online learning and its problems in the COVID-19 emergency period.	Research Article	Reliable and Valid

Data Analysis

The SWOT analysis (Huerta, 2020) helped to understand the various opportunities, threats, strengths, and weaknesses linked with education at different stages of schooling during this important scenario. On the other hand, the research tool utilised analysed the data acquired from multiple sources for the study (Tabuena, Hilario, & Buenaflor, 2021), using content analysis and a descriptive research approach that took qualitative factors into account (Tabuena & Hilario, 2021; Tabuena, Morales & Perez, 2021). The research was based on secondary sources, including websites and research articles as shown in Table 1. The purpose of the SWOT analysis was to help researchers and facilitators in terms of the resources to be employed in online learning, particularly in light of the COVID-19 pandemic. The SWOT analysis will assist in building on highlighted strengths, mitigating weaknesses, seizing accessible opportunities, and countering threats regarding online learning as an alternative mode of instruction in Ecuadorian educational institutions during times of crisis and outbreaks.

Findings

Emerging Institutions Focused on Educational Technology

Over the years, one can observe how teaching methods have evolved from when teachers started using a blackboard to write in the classroom centuries ago, through the inventions of the abacus for mathematics, typewriters, the first printing presses, film clips, the appearance of computers, and the internet, which have served as working tools that help the teacher educate students. In the emergence of computers and the internet, which have served as working tools that help teachers educate students, in the 1970s, for the first time, online education was implemented at the University of Illinois and finally led to the management of educational technology (EdTech) and digital transformations in education in the 21st century. In Ecuador, various institutions in primary, secondary, and higher education have adopted the use of technological tools since 1999 with e-learning programs (e-learning), in 2009 with social networks, in 2012 with MOOCs (Massive Online Courses — and free), and in 2018 with VA/AR (virtual and augmented reality) to bring the teaching and learning process online for students, which have been lifesavers during the COVID-19 health emergency (Delgado, 2019).

In 2016, Ecuador became a leader in the EdTech industry in Latin America, where Ecuadorian start-ups in EdTech entered the education sector with virtual or digital learning initiatives; the most prominent start-ups were Idukay, with 250,000 users, Cuestionarix, AlaU, Newton Virtual, Educadots, and YPDEcuador (Miramontes, 2019), which are taking advantage of the opportunity amid the crisis

by promoting their use through free online digital educational content for teachers and students at all levels of schooling. Thus, they will continue to emerge and compete with large EdTech start-ups that are leaders in the Latin America sector, such as Colegium, Digital House, BabySparks, Crehana, Bedu, Platzi, and others (Guijosa, 2018), as well as worldwide competitors, like ABA English, Coursera, Byju's, Sense, Odilo, Xseed, and others (Chaves, 2020).

In the wake of the pandemic, Latin America became the fourth largest EdTech market (AmericaEconomia, 2021) and start-ups in the sector are experiencing unprecedented growth, generating revenues of more than $250 billion for these companies at an annual growth rate of approximately 14% (Edutechnia, 2021). In addition, the sector is promoting educational technology focused on Blockchain, Artificial Intelligence (AI), and Virtual and Augmented Reality, which will be of great help in the future for students across the country. According to UNESCO (2020), in its new international report on the future of education, COVID-19 has resulted in some ideas for public action, such as: make free and open-source technologies available to teachers and students and provide support for Open Educational Resources and freely available digital tools. Education also cannot depend on digital platforms controlled by private start-ups. As well, the implementation and use of educational technology — even though in each region it is still a huge challenge for all students to have an internet connection, especially in rural areas of Ecuador — there is a new challenge after the coronavirus and a responsibility to reflect and match the vulnerabilities that exist.

The challenge is for educators to perfect the skills for the correct handling of EdTech with students, and to avoid distractions and increase their commitment to using them for an effective learning environment (De Souza et al., 2021). However, we must keep in mind that educational technology cannot replace the teacher, but it does serve to provide feedback and improve teaching. In times of crisis suffered by Ecuador and the world due to the epidemic, EdTech proved to be of great help to the educational community (Donahoe et al., 2019) in democratising access to education. These platforms contain a variety of educational content tailored to the needs of customers for continuing education, and users can log in with a smartphone, laptop, or tablet from anywhere and at any time; only an internet connection is required.

SWOT Matrix Analysis of e-Learning in Times of Crisis and Outbreaks

In Ecuador, natural disasters, such as earthquakes, hurricanes, floods, volcanic eruptions, and tsunamis (Bordón, 2008; Sánchez et al., 2017) have paralysed the usual activities of the inhabitants of the region (Barriga López, 2015). In addition to hindering the educational processes of educational institutions at different levels of schooling, the suspension of classes, or in some extreme cases, the permanent closure of schools and colleges and the imparting of knowledge from the teacher to the student has become a difficult task.

Natural phenomena can have serious consequences, such as disease, human mortality, and damage to infrastructure, in addition to causing panic and stress to people due to family separation and interruption of daily life (Comissão Econômica para a América Latina [CEPAL], 2017) and depriving them of their fundamental right to access to education. According to reports from the United Nations Children's Fund [UNICEF] (2018), more than 104 million children and young people do not attend school and one in three do not go to school in countries affected by war or natural disasters. In education, the biggest problems that keep people from getting the help they need are things like crises

and conflicts inside or outside of the country and these affect teachers and students the most. The latter have psychological problems (like fear, anxiety, insomnia, and depression) that can even lead to suicide, which means that people will need help from health professionals in the future (Arias & Garcia, 2019).

On the other hand, global warming, caused by environmental pollution, indiscriminate logging of forests, and irrational exploitation of natural resources such as minerals, causes increased temperatures and leads to climate change, which, increasingly, causes material damage and loss of life. Table 2 shows the natural disasters that have occurred in Ecuador and caused enormous obstacles in the educational field. During such crises, a large number of educational institutions had buildings destroyed and thousands of students were affected (Montero, 2018).

Table 2: Chronology of Natural Disasters in Ecuador

Year	Natural Disaster
1773	Tungurahua Volcano Eruption
1797	Riobamba Earthquake
1868	Ibarra Earthquake
1877-1878	Eruption of Cotopaxi Volcano
1906	Esmeraldas Earthquake and Tsunami
1916-1925	Tungurahua Volcano Eruption
1949	Pelileo Earthquake
1968	Drought Loja
1982-1983	The Child Phenomenon
1987	Reventador Earthquake
1993	La Josefina Dam
1996	Pujilí Earthquake
1997-1998	The Child Phenomenon
1998	Bahía de Caráquez Earthquake
1999	Tungurahua Volcano
2002	Reventador Eruption
2008	Floods Coastal Region
2016	Manabí Earthquake

Faced with catastrophes and crises, educational institutions must look for new ways to continue with the teaching-learning process of students in order not to lose the school period. As an alternative to the use of EdTech (Cueva Gaibor, 2020), conventional models and strategies, such as preparatory materials, learning tools, and other equipment, have helped to establish new models and strategies like hybrid and flexible learning modality for virtual learning, and to break the paradigms of the traditional methodologies established in the classroom. Some decades ago, this was not possible, and over the years, the techniques of the e-learning world have improved to provide benefits and competitive advantages in the training of citizens of the 21st century with educational quality. With the emergence of the pandemic in the world, e-learning has been consolidated as a new educational modality in the different training centers (Pinzón, 2020), such as schools, colleges, and universities. However, many of these centres had to improvise because they were early adopters of digital technologies (Abreu, 2020), and had the task of promoting innovation and transformation towards

online education, with training processes through virtual classrooms with a-synchronous access to students from anywhere and at any time.

For this purpose, the educational community, mainly teachers, has opted to use platforms such as Cloud Meeting, Adobe Connect, Google Hangouts, Webex, and others (Ojuawo, 2020; Oloyede et al., 2021). Due to the circumstances of the pandemic, Zoom Meeting and Microsoft Teams were more commonly used for remote classes. These technological tools help to keep members interconnected (face-to-face) and enable interaction with all members at the same time through video conferences. Thus, the following is the analysis and interpretation of the SWOT matrix (Fig. 1) of the weaknesses, threats, strengths, and opportunities of network-based training during such difficult situations affecting the educational environment.

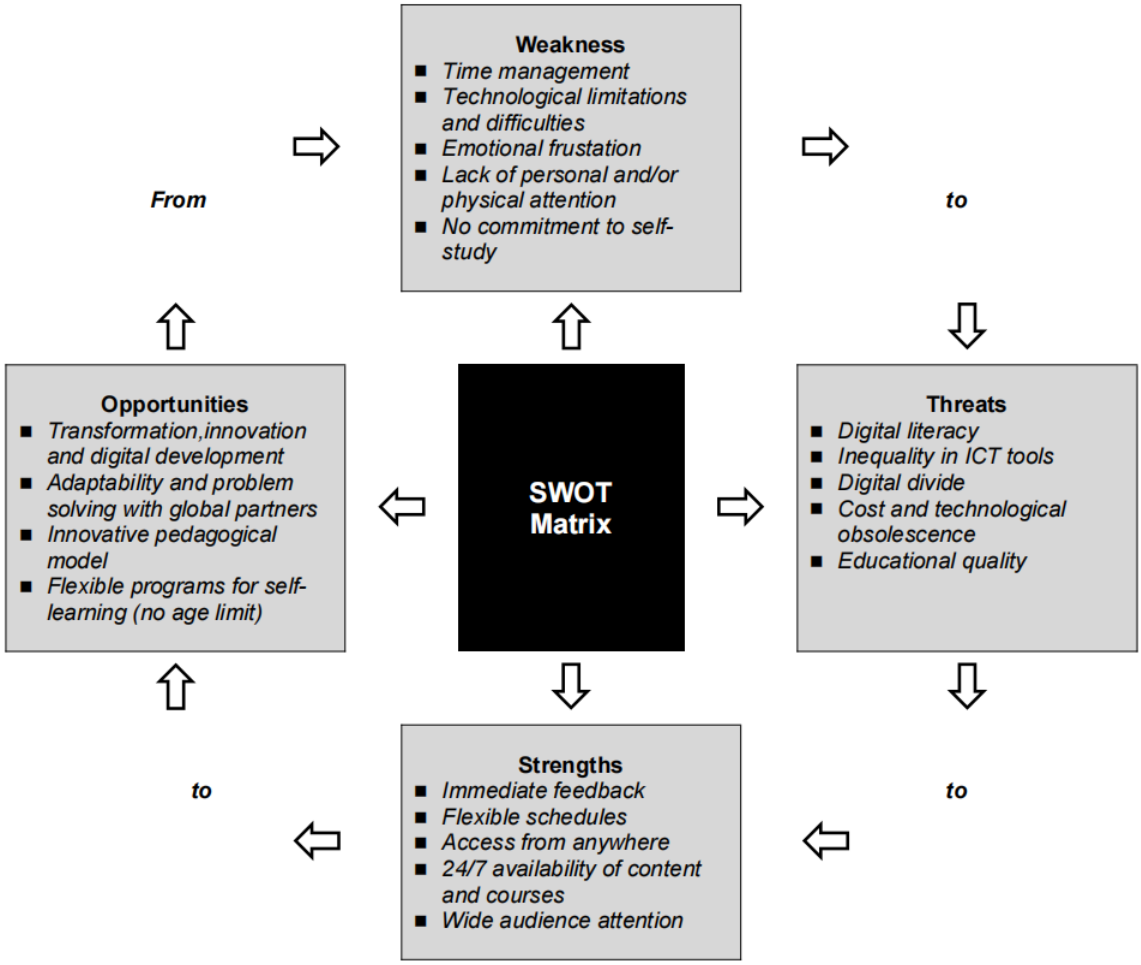

Figure 1: SWOT Matrix on Online Learning Amidst Crises and Outbreaks

Weaknesses

Online teaching and learning have certain difficulties in maintaining communication between teacher and student because direct and physical contact between people is lost. The technical problems of connectivity, technological equipment, and internet access for users can hinder e-learning processes (Favale et al., 2020). Despite the advantages offered by virtual education due to the flexibility of time

and geographical location, these aspects are also fragile. In addition, the involuntary performance of students in the management of their time can cause inconveniences. Their skills and their level of confidence are different and vary with each learner (we are not all the same). Many people do not like to be educated virtually from behind a screen. Therefore, they decide not to continue or end up rejecting this modality of study, at the same time feeling uncomfortable and experiencing increasing confusion and frustration. The inappropriate relationship between the design of the technology and the appropriate psychology component required for the learning process can unbalance, obstruct, and create an imbalance in education.

Online pedagogy has faced a huge challenge in pre-confinement, confinement, and post-confinement with certain weaknesses that are not always considered and included (Aretio, 2021), with difficulties arising in educational centers that have continued even with the technological innovation strategy. Educating students from home is impossible due to the lack of smartphones and internet access (Constante, 2020), as well as other training needs of educators in the use of technological tools and inaccuracy in the self-regulation of content planning tasks. This has made it difficult to encourage, attract, and involve student-teachers in the distance modality with new pedagogical methodologies without losing the quality of content in the e-learning programs.

Threats

Most of the educational community do not have basic computer skills, and both teachers and students cannot make proper use of digital devices focused on education. In many cases, they cannot even acquire technological equipment and have never really practiced online learning. This marks a difference between inequality and technological inequity. Especially for those residing in rural areas (Vivanco-Saraguro, 2020) where, due to their geographic location, it is difficult to install and access the internet or a wi-fi connection. The authorities of educational centers at all levels of schooling must face many challenges to ensure equal access (digital equity) to information, communication, and technology (ICT) with all the necessary resources, and reduce the digital divide (Hillier, 2018). It appears simple but it is not; it requires financial resources to acquire and provide technological infrastructure, as well as continuing to maintain the equipment and devices that become obsolete over time.

The government of Ecuador, in its educational policies for schools, colleges, and universities, proposes certain e-learning programs for primary and secondary education but the process of control and quality standards that these resources have passed is unknown. We must not only consider the negative aspects (threats), but also take action and make the best of the situation in order to improve the quality of virtual resources. By creating an effective e-learning environment (Affouneh et al., 2020), these learning resources have improved remote teaching during crises. This led to the circumstances during the current pandemic, in which more digital tools that teachers and students can choose from are available. Many academic institutions have taken initiatives to help guide teachers and students to access and manage e-learning tools and, thus, cover the contents of the curriculum through the use of ICTs, which are presented in different formats such as texts, audios, and videos that serve as supports to complement virtual learning, although such implementation has not been fully effective (Hamid et al., 2020) during the pandemic period.

Strengths

The strengths of the e-learning model are training methods and processes, which are learner-centered, flexible in terms of time and place; facilitate sequential learning, collaborative participation, and self-education in the time available and through the use of modular structure (Forero et al., 2019). In addition, the teacher and/or tutor can customise and structure the curriculum according to the needs of the learners, as well as providing immediate feedback on the platform. These e-learning strengths are advantageous in times of crisis and pandemics. Today, there are many technological tools available through Web 2.0 that can be used to teach effectively and efficiently.

Teachers in virtual classrooms can organise courses using a combination of texts, audio, and videos to strengthen learning content, while at the same time, they can work collaboratively and interact with all members of a group's questions and answers, making live classes more interesting. Online education is fruitful in difficult times, such as natural disasters, man-made catastrophes, and in times of global pandemics (Agbele & Oyelade, 2020; Atienza & Tabuena, 2021). These cause educational centers to close and hamper their mobility but with the virtual modality, access to education is not deprived and can be received at home or the workplace. Through the use of ICT tools, people can work from home or engage in tele-work, tele-education, and tele-medicine, among others, without the need to move from one place to another for a face-to-face or physical meeting. This has led companies, institutions, and/or organisations to adapt to the trend of new technologies to maintain uninterrupted communication.

Opportunities

Overall, the online method and process have presented many opportunities for academic institutions in rural and urban areas during the outbreak of the worldwide pandemic, leading many educational establishments to migrate to the new pedagogical model of virtual training, with educational platforms responding to the need and to cope with the pandemic (Adedoyin & Soykan, 2020). Continuing this response is more sustainable because it is not constrained by age, gender, religion, or location. Teachers can use and implement digital tools focused on the academy to teach their students and design flexible programs for better understanding. The crisis has put people to the test to decide on the need for educational technologies for e-learning. At the same time, EdTech companies have seen an opportunity for transformation, innovation, and educational digital development to prevent education being interrupted or stopped.

In this critical situation, teachers and students must take on challenges to improve problem-solving skills, cooperate among global peers, and develop their capacity for logical, critical, and analytical thinking, for which, users of any age must have access to technological devices and digital content at a convenient time, therefore, taking advantage of the flexibility of time and space for self-learning. Because of the growing market demand for online training that emerged during the pandemic, educational technology companies have the opportunity to innovate and transform educational systems in Latin America, especially in low-income countries (Jordan et al., 2021). These EdTech tools must be suitable for all aspects associated with education and must not ignore the process that begins the moment the student enrolls in first year and then goes through the various stages of teaching, practice, and evaluation until the end of their career, and, finally, to the delivery of certificates or degrees.

Discussion

In previous studies carried out by Kousky (2016), it was revealed that natural disasters are one of the causes that interrupt the education of children, youth, and adults as the forces of nature destroy schools, colleges, and universities. That such situations have resulted in moving entire families to take refuge in difficult times shows the academic impact caused by catastrophes (Pietro, 2018). For instance, the effect of the L'Aquila earthquake reduced the likelihood of students graduating on time, in addition to causing mental trauma in the students, which then increased the dropout rate (Chen et al., 2021). These negative effects and threats also cause innovation and technological development to stop and can also interrupt all teaching and learning modalities (offline, online, blended) for students at different levels of schooling. They cause additional difficulties when disasters occur in cities or populated regions where companies, industries, and educational centers are located.

Some indications and recommendations (Seville, 2014) reported on the experiences of people who lived through the Christchurch earthquake that caused damage to buildings and deaths show that institutions or organisations must develop contingency plans to face challenges such as natural disasters and pandemics. At the same time, Tull et al. (2017) indicated that natural disasters are events that motivate and stimulate educational organisations to adopt new innovative communication and e-learning practices, thereby, fostering student resilience. Other research on the passage of Hurricane Harvey in Houston, Texas in 2017, which caused serious destruction and physical damage to the media and its technological equipment, showed that more than a thousand students in that area suffered from the impact (Holzweiss et al., 2020). For this reason, the authorities approved a strategic plan to delay virtual courses for weeks, and to avoid such a situation, they advise having an emergency plan for the virtual modality. The SAR-CoV-2 outbreak could be dealt with and the consequences mitigated by scenario planning with several options; for example, in case plan A fails have a plan B ready (Rieley, 2018). Therefore, organising and planning (in time); and other innovative solutions that are proposed (Liguori & Winkler, 2020) can also help to resolve critical circumstances in educational institutions. Sometimes crisis and disaster management plans are neither safe nor sufficient, but it is still necessary to implement and include an emergency plan in the educational community, both virtual and on-site.

Undoubtedly, epidemics and natural disasters are inevitable but the use of EdTech is both a strength and an opportunity. As cataloged by De Carvalho et al. (2001), the adoption of tele-education or e-learning through technological means and using the internet in educational institutions are some of the alternatives and essential requirements for the acquisition of knowledge in the 21st century (Meyer & Wilson, 2011). Education-specific technologies or tools can likely help to cope with disasters and provide online services smoothly during and after crises requires a robust information technology (IT) infrastructure (Ayebi-Arthur, 2017). In the case of New Zealand University, after it was severely affected by seismic activity, the use of technology and the deployment of a Learning Management System with digital resources and audio and video recordings of lectures for students helped them to overcome the obstacles quickly and continue with the teaching process. Therefore, it remains of utmost importance in such difficult circumstances to ensure the availability of the following: (a) ICT (information and communication technologies) infrastructure, (b) digital learning tools and resources, (c) teaching methods, (d) services for teachers and students, and (e) cooperation between

governments, companies, and educational institutions to offer online, face-to-face, or blended learning and to not interrupt classes and student learning (Huang et al., 2020).

We are now required to engage in online teaching and learning processes. Something noteworthy about educational technologies is that they have numerous features and benefits as a brand (Cabero, 2006; Singh & Thurman, 2019). This includes flexible web-based training that adapts to the learner's pace, various materials (audio, visual, audiovisual), synchronous or asynchronous communication, and digital content. Along the same lines, Martin (2020) pointed out five important things to consider in embracing a learning system with social media/networking platforms, which helps provide better communication between students and instructors: mental health, relationships, instruction, content and motivation; and valuing students' motivation (Peng & Hwang, 2021). Dhawan (2020) referred to an interesting educational program with the use of EdTech, which has been promoted by the Indian government, with three essential objectives: quality, equity, and access for students across the nation. For example, electronic applications such as Cloud Meeting, Adobe Connect, Google Hangouts, Webex, Zoom Meeting, Microsoft Teams, and others, present superb particularities for live remote classes, conferences, seminars, chats, and meetings that make people interconnected (face-to-face) and enable interaction among members at the same time. Many schools, colleges, and businesses were closed or had curfews during the time when these platforms were being used. They helped the employees of these businesses and schools do their jobs or work from home because of these closures and curfews.

On the other hand, we cannot ignore and/or forget the students who are unable to access technological tools. It is difficult for them to acquire a computer device, cancel a data plan, or access the internet due to low income or lack of economic resources in their homes or geographic locations, and they are the ones who lose out on virtual training, thus increasing the gap of technological inequality among students, so the support of the government and NGOs is crucial. Lack of such support can reduce opportunities to education. In addition, teachers were used to traditional teaching methodologies in the classroom but were not familiar with the virtual teaching environment, so they had no choice but to adapt to new methods of online training, despite their doubts and resistance to change (Richardson & North, 2020).

Finally, to strengthen teaching strategies and facilitate new training processes, classes should be made practical and interesting with games, debates, brainstorming, and so forth. Such activities could help reduce the levels of panic, stress, anxiety, and fear experienced by students. It is also important for the technical and pedagogical competence of teachers, quality management programs, and continuous quality improvement for success in online learning, in addition to preparing people to face any kind of crisis and conflict so we do not waste time assimilating new forms of education but, rather take the opportunity to create more academic content.

Conclusion and Recommendation

The SAR-CoV-2 (COVID-19) epidemic has affected all types of activities, hindering the daily lives of citizens, interrupting the schooling of students, causing material/physical damage to buildings and loss of human life, thus delaying and postponing the planned tasks of companies, organisations, and educational institutions. The worldwide epidemic of the coronavirus has impacted the economies of all regions and cities, as well as universal education. The rapid spread of SAR-CoV-2 in humans did

not give governments and training centers time to develop an emergency plan to cope with the situation. Furthermore, the late redesign of the educational model for students may have hindered learning.

Virtual education in times of crisis and pandemics is an alternative with strengths and opportunities for students who have access to technological tools and the internet, so that the teaching process is not interrupted, while, at the same time it presents a threat to educational communities with low financial resources and to areas remote from the urban core, which have limited EdTech resources. Such a scenario has made the inequality gap widen. At the same time, it has forced teachers to adapt to new pedagogical methodologies and be more familiar with platforms, applications, and virtual courses focused on the academic field. The use and management of computer equipment in schools, colleges, and universities has increased in terms of the commitment, responsibility, and cooperation of teachers.

Academic staff, students, parents, and local or national authorities should be trained on the use, management, and importance of ICTs in the 21st century but they must bear in mind that, without technological infrastructure, it is not possible to access online education. As a result, a relationship with the diversity of ICT infrastructure is required, and ICT must be available on a daily basis.

References

Abreu, J. L. (2020). Tiempos de Coronavirus: La Educación en Línea como Respuesta a la Crisis. *Revista Daena (International Journal of Good Conscience), 15*(1), 1-15.

Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments,* 1-13.

Affouneh, S., Salha, S., & Khlaif, Z. N. (2020). Designing quality e-learning environments for emergency remote teaching in coronavirus crisis. *Interdisciplinary Journal of Virtual Learning in Medical Sciences, 11*(2), 135-137.

Agbele, A. T., & Oyelade, E. A. (2020). Impact of COVID-19 on the Nigerian educational system: Strengths and challenges of online/virtual education. *Asian Journal of Education and Social Studies, 13*(1), 26-35.

Alvarez Jr, A. (2020). The phenomenon of learning at a distance through emergency remote teaching amidst the pandemic crisis. *Asian Journal of Distance Education, 15*(1), 127-143.

Ambit BST (2020, November 10). *Types of computer vulnerabilities and threats.* Barcelona. https://www.ambit-bst.com/blog/tipos-de-vulnerabilidades-y-amenazas-inform%C3%A1ticas

AmericaEconomia (2021, September 16). Trends and challenges for the implementation of e-learning models in Latin America. *AméricaEconomía.* https://mba.americaeconomia.com/articulos/notas/tendencias-y-desafios-para-la-implementacion-de-modelos-e-learning-en-america-latina

Aretio, L. G. (2021). COVID-19 and digital distance education: Pre-confinement, confinement and post-confinement. *Ried-Revista Iberoamericana De Educacion a Distancia, 24(*1), 9-32.

Arias, P. R., & García, F. E. (2019). Crecimiento postraumático en sobrevivientes de los terremotos en ecuador y chile. *Ajayu Órgano de Difusión Científica del Departamento de Psicología UCBSP, 17*(2), 317-331.

Atienza, M. A., & Tabuena, A. C. (2021). The impact of COVID-19 pandemic on managerial accounting and its adjustments in financial markets. *International Journal of Business, Technology and Organizational Behavior, 1*(4), 287-296.

Ayebi-Arthur, K. (2017). E-learning, resilience and change in higher education: Helping a university cope after a natural disaster. *E-learning and Digital Media, 14*(5), 259-274.

Barquero, J. (2019, June 28). *6 características imprescindibles de una plataforma e-learning | CAE.* CAE Computer Aided E-learning. TM Voluxion, Verxact, Dexway by CAE Computer Aided USA Corp. & Computer Aided Elearning, SA. https://www.cae.net/es/6-caracteristicas-imprescindibles-de-una-plataforma-e-learning/

Barriga López, F. (2015). *History of natural disasters in Ecuador.* Quito: National Academy of History of Ecuador. https://www.ipgh.gob.ec/portal/index.php/biblioteca-menu/novedades-bibliograficas/389-historia-de-los-desastres-naturales-en-el-ecuador

Bordón, O. E. (2008). Natural disasters and society. *Electronic medical journal, 30*(4), 518-525.

Bravo, C. D. S., Dimalanta, F. D. R., Jusay, K. A. P., Vitug, M. Y., & Tabuena, A. C. (2022). Inclination state on the Philippine culture and arts using the appraisal theory: Factors of progress and deterioration. *Participatory Educational Research, 9*(1), 388-403. https://doi.org/10.17275/per.22.21.9.1

Cabero, J. (2006). Pedagogical bases of e-learning. *RUSC. Universities and Knowledge Society Journal, 3*(1).

Carey, K. (2020, March 13). Everybody ready for the big migration to online college? Actually, no. *The New York Times.* https://www.nytimes.com/2020/03/13/upshot/coronavirus-online-college-classes-unprepared.html

Chaves, A. (2020, August 18). *EdTech: qué es y 10 grandes ejemplos de disrupción educativa.* Marketing 4 Ecommerce — Tu revista de marketing online para e-commerce. https://marketing4ecommerce.net/el-momento-del-edtech-que-es-y-grandes-ejemplos/

Chen, Y. E., Li, C., Chang, C. P., & Zheng, M. (2021). Identifying the influence of natural disasters on technological innovation. *Economic Analysis and Policy, 70,* 22-36.

Cojocariu, V. M., Lazar, I., Nedeff, V., & Lazar, G. (2014). SWOT analysis of e-learning educational services from the perspective of their beneficiaries. *Procedia-Social and Behavioral Sciences, 116,* 1999-2003.

Comissão Econômica para a América Latina (2017, April 18). *Social protection of children in the face of disasters.* https://www.cepal.org/es/enfoques/proteccion-social-la-infancia-frente-desastres

Constante, S. (2020, June 16). *Ecuador: la educación online desde casa es imposible e injusta.* El País. https://elpais.com/elpais/2020/06/12/planeta_futuro/1591955314_376413.html

Cueva Gaibor, D. A. (2020). Educational technology in times of crisis. *Conrado Journal, 16*(74), 341-348.

De Carvalho, J. M., Simoes, L., & Penido, A. (2001). Education and technology: Conflicts and possibilities. *Comunicar, 22,* 63-70.

De Souza, R., Parveen, R., Chupradit, S., Velasco, L. G., Arcinas, M., Tabuena, A. C., ... & Ventayen, R. J. M. (2021). Language teachers' pedagogical orientations in integrating technology in the online classroom: Its effect on students motivation and engagement. *Turkish Journal of Computer and Mathematics Education, 12*(10), 5001-5014. https://turcomat.org/index.php/turkbilmat/article/view/5268

Delgado, P. (2019, November 12). *¿Qué es EdTech?* Observatorio | Instituto para el Futuro de la Educación. https://observatorio.tec.mx/edu-news/que-es-edtech-video

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of educational technology systems, 49*(1), 5-22.

Donahoe, B., Rickard, D., Holden, H., Blackwell, K., & Caukin, N. (2019). Using EdTech to enhance learning. *International Journal of the Whole Child, 4*(2), 57-63.

Edutechnia (2021, August). *EdTech a market with a future for Latin America.* https://edutechnia.com/es/blog-articulo/130/EdTech-un-mercado-con-futuro-para-Amrica-Latina

Favale, T., Soro, F., Trevisan, M., Drago, I., & Mellia, M. (2020). Campus traffic and e-Learning during COVID-19 pandemic. *Computer networks, 176,* 107290.

Forero, J. C. G., Marín, A. Á., & Estupiñan, J. C. M. (2019). Organización de un curso en aulas virtuales: Fortalezas y debilidades para el aprendizaje. *Archivos Venezolanos de Farmacología y Terapéutica, 38*(4), 473-478.

Global Voices (2020, April 15). *Ciudades fantasma en un mundo de COVID-19.* Global Voices en Español. https://es.globalvoices.org/2020/04/15/ciudades-fantasma-en-un-mundo-de-covid-19/

Grewal, D., Puccinelli, N. M., & Monroe, K. B. (2018). Meta-analysis: Error cancels and truth accrues. *Journal of the Academy of Marketing Science, 46*(1).

Guijosa, C. (2018, November 21). *Las ocho 'EdTech startups' latinoamericanas más prometedoras del 2018.* Observatorio | Instituto para el Futuro de la Educación. https://observatorio.tec.mx/edu-news/las-ocho-edtech-startups-latinoamericanas-mas-prometedoras-del-2018

Hamid, R., Sentryo, I., & Hasan, S. (2020). Online learning and its problems in the Covid-19 emergency period. *Journal Prima Edukasia, 8*(1), 86-95.

Hillier, M. (2018). Bridging the digital divide with off-line e-learning. *Distance education, 39*(1), 110-121.

Holzweiss, P. C., Walker, D. W., Chisum, R., & Sosebee, T. (2020). Crisis planning for online students: Lessons learned from a major disruption. *Online Learning, 24*(2), 22-37.

Huang, R. H., Liu, D. J., Tlili, A., Yang, J. F., & Wang, H. H. (2020). Handbook on facilitating flexible learning during educational disruption: The Chinese experience in maintaining undisrupted learning in COVID-19 outbreak. *Beijing: Smart Learning Institute of Beijing Normal University, 46.*

Huerta, D. S. (2020). *SWOT analysis.* Bubok.

Jordan, K., David, R., Phillips, T., & Pellini, A. (2021). Education during the COVID-19: Crisis Opportunities and constraints of using EdTech in low-income countries. *Revista de Educación a Distancia (RED), 21*(65).

Keeton, M. T. (2004). Best online instructional practices: Report of phase I of an ongoing study. *Journal of Asynchronous Learning Networks, 8*(2), 75-100.

Kousky, C. (2016). Impacts of natural disasters on children. *The Future of Children, 26*(1), 73-92.

Liguori, E., & Winkler, C. (2020). From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. *Entrepreneurship Education and Pedagogy, 3*(4), 346-351.

Martin, A. (2020, March 16). *How to optimise online learning in the age of Coronavirus.* UNSW Newsroom. https://newsroom.unsw.edu.au/news/social-affairs/how-optimise-online-learning-age-coronavirus

McBrien, J. L., Cheng, R., & Jones, P. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *International Review of Research in Open and Distributed Learning, 10*(3).

Meyer, K. A., & Wilson, J. L. (2011). The role of online learning in the emergency plans of flagship institutions. *Online Journal of Distance Learning Administration, 14*(1).

Miramontes, C. (2020, July 12). *5 startups ecuatorianas de tecnología que están mejorando la educación.* Contxto. https://contxto.com/es/general-es/5-startups-ecuatorianas-de-tecnologia-mejorando-la-educacion/

Montero, L. G. (2018). *History of serious natural disasters in Ecuador.* Secretaria de Gestion de Riesgos. https://capacitacion.gestionderiesgos.gob.ec/courses/57/files/6398

Oloyede, A. A., Faruk, N., & Raji, W. O. (2021). COVID-19 lockdown and remote attendance teaching in developing countries: A review of some online pedagogical resources. *African Journal of Science, Technology, Innovation and Development,* 1-19.

Oyedotun, T. D. (2020). Sudden change of pedagogy in education driven by COVID-19: Perspectives and evaluation from a developing country. *Research in Globalization, 2,* 100029.

Parkes, M., Stein, S., & Reading, C. (2015). Student preparedness for university e-learning environments. *The Internet and Higher Education, 25,* 1-10.

Partlow, K. M., & Gibbs, W. J. (2003). Indicators of constructivist principles in Internet-based courses. *Journal of Computing in Higher Education, 14*(2), 68-97.

Peng, M. H., & Hwang, H. G. (2021). An empirical study to explore the adoption of e-learning social media platform in Taiwan: An integrated conceptual adoption framework based on technology acceptance model and technology threat avoidance theory. *Sustainability, 13*(17), 9946.

Pietro, G. D. (2018). The academic impact of natural disasters: evidence from L'Aquila earthquake. *Education Economics, 26*(1), 62-77.

Pinzón, L. R. P. (2020). Orígenes y transformaciones del aprendizaje en línea (E-learning). Innovaciones educativas mediadas por paradigmas tecnológicos. *Revista Historia de la Educación Colombiana, 24*(24), 105-132.

Rezapour-Nasrabad, R. A. F. A. T. (2020). Effects of Covid-19 on higher education: Challenges and responses. *Pakistan Journal of Medical and Health Sciences, 14*(3), 1366-1370.

Richardson, R., & North, M. (2020). Transition and migration to online learning environment. *International Management Review, 16*(2), 5-105.

Rieley, J. B. (2018). *Scenario planning in higher education: a follow-up to the process.* https://www.researchgate.net/publication/325857787_Scenario_Planning_in_Higher_Education_A_Follow-Up_to_the_Process

Sánchez, R. M. S., Grijalva, M. V. G., López, Á. H. V., & Muñoz, J. C. V. (2017). Desastres naturales–terremotos y seguros en Ecuador. *Ojeando la agenda,* (48), 2.

Scheiderer, J. (2021, March 24). What's the difference between asynchronous and synchronous learning? *Ohio State Online*. https://online.osu.edu/resources/learn/whats-difference-between-asynchronous-and-synchronous-learning

Seville, E., Hawker, C., & Lyttle, J. (2012). *Resilience tested: A year and a half of 10,000 aftershocks.* University of Canterbury. https://ir.canterbury.ac.nz/handle/10092/9820

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education, 33*(4), 289-306.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The internet and higher education, 7*(1), 59-70.

Tabuena, A. C., & Hilario, Y. M. C. (2021). Research data analysis methods in addressing the K-12 learning competency on data analysis procedures among senior high school research courses. *International Journal of Recent Research and Applied Studies, 8*(3), 1-7.

Tabuena, A. C., Hilario, Y. M. C., & Buenaflor, M. P. (2021). Overview and exemplar components of the research methodology on the research writing process for senior high school students. *International Journal of Trends in Scientific Research and Development, 5*(3), 117-126.

Tabuena, A. C., Morales, G. S., & Perez, M. L. A. C. (2021). Music assessment techniques for evaluating the students' musical learning and performance in the Philippine K-12 basic education curriculum. *Harmonia: Journal of Arts Research and Education, 21*(2), 192-203.

Thompson, K. M. & Copeland, C. (2020). Inclusive considerations for optimal online learning in times of disasters and crises. *Information and Learning Sciences, 121*(7/8), 481-486.

Torres, A. C. (2010). *Research methodology, administration, economics, humanities and social sciences* (Tercera, Ed.). Pearson Educacion.

Tull, S., Dabner, N., & Ayebi-Arthur, K. (2017). Social media and e-learning in response to seismic events: Resilient practices. *Journal of Open, Flexible and Distance Learning, 21*(1), 63-76.

United Nations Educational, Scientific and Cultural Organization (2020, June 22). *Education in a post-COVID world: Nine ideas for public action.* UNESCO. https://en.unesco.org/news/education-post-covid-world-nine-ideas-public-action

United Nations Children's Fund (2018). *More than 104 million children and young people — 1 out of every 3 — do not attend school in countries affected by war or natural disasters.* https://www.unicef.org/es/comunicados-prensa/m%C3%A1s-de-104-millones-de-ni%C3%B1os-y-de-j%C3%B3venes-1-de-cada-3-no-van-la-escuela-en-los

Vivanco-Saraguro, Á. (2020). Teleducación en tiempos de COVID-19: brechas de desigualdad. *CienciAmérica, 9*(2), 166-175.

Watermeyer, R., Crick, T., Knight, C., & Goodall, J. (2021). COVID-19 and digital disruption in UK universities: Afflictions and affordances of emergency online migration. *Higher Education, 81*(3), 623-641.

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