

HOW TECHNOLOGY CAN MITIGATE THE IMPACT OF COVID 19 ON EDUCATION? A CASE STUDY OF SAUDI ELECTRONIC UNIVERSITY (SEU)

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ABSTRACT

This paper discusses a case study research approach with the aim to find out how technology can mitigate the impact of COVID 19 on Education. It outlines how Saudi Electronic University (SEU) used information and communication technologies (ICTs) for the purpose of education before COVID-19, which help mitigate the impact of COVID 19. Data for this investigation include real information from the learning management system for six weeks before the crisis, which evaluated and compared with the following six weeks after switching to fully online given education and learning because of the pandemic. The findings indicate that the adoption of blended learning method that involves educational technology facilitate the shift to fully online and greatly mitigate the impact of COVID 19 on learning environment.

Keywords: *COVID 19; Technology; Education; Saudi Electronic University*

1. INTRODUCTION

The novel coronavirus, popularly known as COVID-19, began its spread during in December 2019. The virus originates from China, in specific from the city of Wuhan. As the virus originally was rapidly spreading in the area, it did not take long for it to extend its reach to all of China. Wuhan authorities were vigilant and took genuine steps to stop the spread. This included shutting Wuhan down in the form of a lockdown in January 2020 [1]. China's example was used by other countries as the virus penetrated other parts of the world, and similar steps were followed. Within just a couple of weeks, the number of cases shot up, forcing the World Health Organization (WHO) to change its classification from epidemic to pandemic. As of May 5, 2020, data from John Hopkins University (JHU) shows that more than 185 countries are tackling infections, and more than 3.6 million people have been infected, and another 250, 00 are dead. [2].

As a response to the spread of the disease, dozens of countries instituted travel bans on both domestic and international movement. Measures such as self-isolation and social distancing were adopted as protection by many governments. To help healthcare facilities and staff deal with the

influx of patients, people were told to quarantine themselves at home, even if they presented with symptoms, albeit only mild ones. Businesses have been shut down and those who can have been asked to work from home. Many nations have also shut down places like restaurants, gyms, cinema, etc. i.e. any place that allows people to gather in groups.

To help tackle the fallout from the rise of infections, schools, colleges, and universities have also been closed in most countries. As of April 18, 191 countries shut down their schooling sector, resulting in around 91% of the world's population having to study at home. Many countries are looking at localized closures that affect millions of students [3].

Given the conditions brought on by the pandemic, many educational institutions have been postponing or cancelling campus events around the globe. This includes sports, workshops, conferences and more. Universities have had to speedily transition into models that allow for delivery of lessons in a more digitized manner i.e. face-to-face online deliver [4].

This study is conducted within the Information System research field. As such, the "technological" focus is on the systems that students and instructors utilize as part of the educational process. It helps

augment understanding on how to use technology in the best possible way in an educational setting. More specifically, the study makes use of the interpretive case study approach to allow in-depth exploration of how technology can mitigate the impact of COVID 19 on education.

This paper is structured as follows. It begins with light introduction about how Information and Communication Technology is used in the education sector and the digital transformation in education. This is followed by a comprehensive discussion on the Saudi Electronic University (SEU). Next, a description and justification of the research methodology is presented. This paper looks at a discussion and analysis of the data collection, followed by a summarization of the main points, and finally a conclusion.

2. ICT IN EDUCATION

ICT refers to “Information and communication technology”. It involves technologies that allow for information to be accessed with the help of technology. It shares similarities with IT or information technology, but its main focus is on communication. It normally encompasses wireless networks, cellphones, internet, and other similar mediums [5]. In particular, ICTs in the context of education refer to technologies that aid instruction or learning [6].

The United Nation’s division on education i.e. United Nations Educational, Scientific, and Cultural Organization (UNESCO) has added ICT into its efforts for educational equity and access. The following text, extracted from a UNESCO document on ICT and education, expands on its position on the subject [7]. "Information and Communication Technology can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development and more efficient education management, governance and administration. UNESCO takes a holistic and comprehensive approach to promoting ICT in education. Access, inclusion and quality are among the main challenges they can address. The Organization's Intersectoral Platform for ICT in education focuses on these issues through the joint work of three of its sectors: Communication & Information, Education and Science. [7]. "

With the advent of Information and communication technology, the traditional setup of learning is evolving into fully e-learning or blended learning. "E-learning is the term given to a kind of

instruction and learning system in which the students and the teacher, or whoever is involved in the interchange of information, do not meet physically, but rather are separated by time, distance, or both. This separation is bridged with the help of communication technology, including the Internet and emergent educational technologies. E-learning may or may not be in real time. A more formal definition of e-learning is "the delivery of a learning, training, or education program by electronic means. E-learning involves the use of a computer or electronic device—in some way to provide training, educational or learning material" [8].

Nevertheless, blended learning has been outlined as a solution in a short amount of time. This form of learning puts the conventional together with the digital, brining e-learning and face-to-face learning together as a combination. Such models include a mixture of both approaches so that the best possible engagement and interaction can be developed between the instructors and the learners, using technology-mediated solutions. UNESCO places an emphasis on this being a valuable approach to augmenting and promoting learning. It is a viable solution with which countries can reach their goals set under the Sustainable Development Goals, with a focus on education. Using this form of education is more prevalent in higher education. Researchers are of the view that these models will become the new "traditional model" [9] or the "new norm" for higher education courses [10].

One of the educational institutes that applied blended learning model is the Saudi Electronic University which will be expanded on within the section 4.

3. COVID 19 AND THE DIGITAL TRANSFORMATION IN EDUCATION

As discussed in the previous section, the integration and adoption of information technology in instructive settings has been under discussion for several years and several literatures, such as Brown [11], Dermentzi and others [12], and Hung and Yyen [13] confirmed that technology can positively assist both students and teachers in various educational processes.

With the spread of COVID-19 around the world, a lot of educational institutes including schools and universities have been abruptly forced to engage in the digital transformation. This is generally involved in all aspects in our daily life. It can be

identified as the “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies” [14; p. 118]. Despite this, the emphasis of this study is in the digital transformation in education pushed by the COVID-19 pandemic.

As a result of the preventive procedures against the spread of a COVID-19 pandemic, the use of technology and shifting to distance education was the most appropriate solution for a lot of educational institutes in order to keep running the educational process. Although there are several challenges for the shifting to distance learning, a lot of advantages acknowledged especially that are related to the digital transformation in education which may take years under the normal circumstances [15]. The level of success in the shift to distance learning during the pandemic is influenced by a number of factors. Different concerns are reported that declared the impact of unpreparedness to the use of technology by both students and teachers, lack of access to the required technology, low-level technology implementation prior to the current circumstances [7].

Prior to the COVID-19 pandemic, schools and universities differ with the regard to the use of educational technologies, including social media, learning management systems, and virtual learning platforms. At the time of COVID-19, the need for innovative solutions to enhance educational endeavors has accelerated. Many educational institutes tried their best to quickly adopt different technologies to mitigate the effects of the pandemic. Accordingly, this study will address the gaps in existing literature on investigating how technology can mitigate the impact of such COVID-19 pandemic.

4. SAUDI ELECTRONIC UNIVERSITY

4.1 Background

The Saudi Electronic University was established in 2012 as a publically funded institution of higher education and provider of lifelong learning. Since its inception, The Saudi Electronic University has adopted the "blended learning" model as a medium of instruction, which has been devised as per a blend of convention and e-learning. The university adopted the term "blended learning" to describe the use of ICT to augment both instruction and learning. As a hallmark of this type of education, ICT is used to enrich the teaching and learning

process through interactive learning activities that go above and beyond those achieved through traditional learning activities. To achieve this, the university uses one of the most advanced and well regarded -learning platforms in the world (Blackboard). Blended learning approach uses several methods to deliver learning [16]. For example, combining face to face interaction with virtual lectures, in addition to self-learning activities geared towards developing students' independent learning and commitment.

4.2 Learning Model

Figure 1 illustrate the learning model in SEU. Details of the blended learning model applied in SEU include the following:

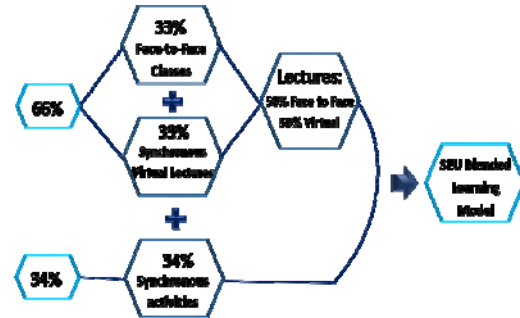


Figure 1: SEU learning model

- *Face to face lectures:* The face to face component constitutes about 33% of the educational process. It involves a weekly scheduled face to face lectures with the course instructor throughout the semester with the express purpose of imparting information and providing opportunity for student to engage with the course and with their peers. It also gives the student the chance of benefiting from their instructor, not only in terms of content but also an opportunity for academic and personal advising.
- *Virtual lectures:* Virtual lectures component also constitutes about 33% of the educational process and revolves around a weekly interactive live scheduled online meet up through the learning management system which is blackboard platform.
- *Self-learning activities :* The self-learning constitutes about 34% of the educational model. The platform provides learners

with many simultaneous interactive activities such as chat and instant messaging, audio and video conferencing, live webcasting, application sharing, and whiteboard. There are also asynchronous activities such as Webcasting, Wiki, forums Blog, Discussion Board, E-mail. In addition to the recorded lectures available to students 24/7 other sources of knowledge sharing is provided.

The university adopts a learner-centered approach, where the student contributes to the development of knowledge and skills through the assignments, tasks and other experiential opportunities that mirror the skills and demands of the working world imbedded in the evaluation process. Furthermore, the university considers the blended learning model a contemporary educational model that provides an integrated educational environment for students through:

- Providing all course materials in an electronic format.
- Evaluating students regularly and periodically while providing immediate feedback.
- Opportunities for students to learn from their peers and develop essential life skills like working collaboratively and leadership skills.
- planning for personal-development
- The opportunity to submit all required assessments electronically.

4.3 Critical factors

To ensure the success of the blended learning model, the university embarked on creating a set of factors that would strengthen the learning model and this can be summarized in two main factors namely:

1. *Technical factors:* since its establishment, The Saudi Electronic University has worked to provide an interactive electronic environment that responds to the needs of blended learning. It covers the needs of all parties in the educational process, both academically and administratively. The university provides all its users including faculty, staff and students platforms pertinent to them.

2. *Factors related to building human capacity:* mainly represented in training and preparation of the three aforementioned entities:

- Train technicians to operate and maintain the various systems that the university uses in the educational process. The University organizes, in partnership with Blackboard, highly specialized courses for technicians in two areas. First area concentrates on training for the application side of the (Blackboard) system. To provide the trainees with the technical skills and know-how of the system so that they can provide technical support to the end users namely the faculty and students (Blackboard Training Solution Proposal: Technical Team Training). The second field focuses on the training for the technical aspects of the Blackboard system to provide the trainees with the technical knowledge of the system and enable them to deal with any technical problems that might arise (Blackboard Training Solution Proposal: Core Team Training).
- Train the faculty members in the use of blended learning methods. The sessions are geared towards equipping the faculty with the knowledge and skills necessary for the successful implementation of the model. In cooperation with its strategic partners, the university initiated a periodic training course called "Strategies for Teaching in a Blended Learning Environment" to prepare new faculty members to transition into electronic teaching methods. Also, a training program has been developed for faculty members to qualify them for an e-learning certificate called (Online Teaching Certificate Program).
- Train students in the use of the blackboard by providing electronic training through the university's online portal (Online Blackboard Training for Students).

4.4 Impact of COVID 19 on SEU

Among the efforts by Saudi government to reduce the spread of the COVID-19 virus, Ministry of Education decided on 9th of March 2020 to suspend attendance all schools, universities, and educational institutes in the country and shift to distance learning. As a result, SEU move directly

on the same day to fully online learning. More specifically, it takes the following actions:

- Transform all face to face classes across the entire university to virtual classes with the same schedule. This was easy to implement because all students and faculty members already had competencies on e-learning with a mature infrastructure.
- Although flexibility is required to make sure that varying learning outcomes can be made possible through different programs, it is important to maintain consistency across the university, especially because of the pandemic. It is not up to the individual departments to figure out how e-learning can be implemented throughout the campus. It is important to ensure that accountability is accompanied by flexibility. Alternative solutions or processes are needed so that existing on-campus assessments can be easily replaced. As the crisis continues, degree programs must be recognized, and all learning outcomes must still come to fruition. A policy was also drawn to ensure flexibility with a speedier route for approvals or changes that are required. This made sure that all changes to assessments were balanced, fair and reasonable. The existence of both Blackboard and Swift Assess systems facilitate this change.
- Following the policy made by the Ministry of Education during the crises, It was decided to change the distribution of marks in all courses to be 80 for coursework and 20 for final exam, that will be done remotely, instead of 50, 50 for each.

5. METHODOLOGY

This paper uses the case study approach to investigate the research questions under discussion. The approach taken to research was interpretive and hence the case study approach employed was also interpretive.

The case study research approach is considered to be an accepted research strategy within the Information Systems (IS) field [17] and there are significant publications within the IS field from case studies [18]. Cavaye [17] argues that when people and organizational phenomena are studied

(such as in IS field) the capturing of the context of phenomena is always important and “therefore, case research is always an appropriate research strategy in IS” [17].

Benbasat, Goldstein, and Mead [19] outlines three main ideas as to why case study research is a useful approach to deploy. To start with, this allows the research to take place in a natural setting. Furthermore, researchers can explore how and why questions exist. Finally, they allow examination of areas where studies have been conducted in the past. Case studies make it possible for researchers to “learn about the state of the art and generate theories about the state of the art”; to understand the complex nature of the subject. Case studies make it possible for investigators to look at technologies that are changing rapidly without any previous development of theory [19].

Yin [20] looked at the method as a comprehensive strategy for research, which used particular approaches for both analysis and data collection. Case study, as per Yin is defined as an inquiry of an empirical nature, which:

- “Investigates a contemporary phenomenon within its real-life context, where boundaries between phenomena and context are unclear,
- Contains many more interesting variables than data points,
- Relies on multiple sources of evidence with data converging to form results,
- Benefits from prior theoretical propositions to guide data collection and analysis” [20].

Cavaye [17] sees the case study approach as an approach that uses the case study method. Another characteristic of the case study research approach is to look for “in-depth understanding of the context of a phenomenon” [17] and [21]. This type of a study can be executed through interpretive or positivist research assumptions [22].

For this research, the case study develop is an interpretive case study, where understanding how the context of how the adoption of technology in SEU has played out helps identify the route through which tech has been helping online education during the pandemic.

This approach may consist of just one case or multiple case explorations. Using a sole case allows in-depth exploration of a phenomenon, leading to the rich description of the case.

Benbasat and others [19] suggest that single cases should be mostly used for exploration and hypothesis generation. The case study research approach allows in-depth exploration of a phenomenon within the phenomenon's natural setting. This method can be seen as adequate or appropriate where there is a dearth of past research or related theory in terms of the subject, from which data or information can be drawn upon [19];[20];[17];[22].

This is the reason that the sole case study approach has been used in this research to explore the phenomenon of how technology can mitigate the COVID-19's impact on Education.

6. DATA COLLECTION AND ANALYSIS

The data for this study was acquired from the learning management system adopted by the university which is Blackboard system after getting the required approval from the university. The justification of collecting the data from the system is to rely on real data to help answer the research question by comparing and evaluating the use of the educational technologies before and after the crisis to show evidences on how technology can

mitigate the impact of COVID 19 on education in SEU.

For the purpose of this study, the data source was based on the metrics reports for both "Blackboard learn" and "Blackboard collaborate". The required data was first identified then extracted from the system following the procedures provided by Blackboard in order to insure that the code processing the request includes the correct values. Then, the obtained data was reviewed by two separate individuals in order to ensure that it is clear, correct, and accurate. The obtained data from the "Learn" and "Collaborate" metrics include daily users' logins, discussion boards, assessments, course documents viewed, virtual classes lunched, and number of unique attendees in virtual classes. All the collected data belongs to the current semester that started in January and finish in May 2020. More specifically, data for twelve weeks about the previous mentioned tools has been collected from the system. Six weeks of the collected data, shown in Table 1, is for the period before the pandemic and the closure of the university. The rest of the data is for the following six weeks after switching to fully online and it is shown in table 2. Thus, data from one semester before and after the crisis are evaluated and compared as follows.

Table 1: Students interactions before COVID 19

Date	Logins	Asses-Sments	Discu-Ssions	Documents Viewed	Session Launched
27-Jan-20	8591	654	1189	694386	1416
28-Jan-20	8717	851	1058	694520	1353
29-Jan-20	8970	1338	648	694637	1455
30-Jan-20	4226	791	616	694710	220
2-Feb-20	10056	2920	1024	696082	1289
3-Feb-20	9877	1307	1362	695179	1452
4-Feb-20	10412	1749	1916	695399	1556
5-Feb-20	10224	3180	1721	695579	1667
6-Feb-20	5989	4003	1238	695627	298
9-Feb-20	10819	3197	1298	696030	1318
10-Feb-20	10421	2954	1727	696176	1557
11-Feb-20	10722	3647	2615	696320	1581
12-Feb-20	10796	6076	2250	696493	1587
13-Feb-20	6904	5891	1041	697122	242
16-Feb-20	11133	5184	1360	697927	1373
17-Feb-20	10591	3689	1417	698174	1496
18-Feb-20	10836	4363	2537	698398	1605
19-Feb-20	10830	6715	1785	698590	1638
20-Feb-20	7403	6979	1117	698730	335
23-Feb-20	11105	5778	973	699152	1316
24-Feb-20	10619	4226	980	699246	1521
25-Feb-20	10884	5564	1741	699308	1598
26-Feb-20	10659	8185	1256	699404	1579
27-Feb-20	7462	7445	771	699455	300
1-Mar-20	10308	5693	795	699694	3420
2-Mar-20	9886	7589	1092	699779	3241
3-Mar-20	9743	6140	1484	699858	3194

4-Mar-20	9748	6586	1123	699937	2970
5-Mar-20	7919	6801	758	700005	347
8-Mar-20	9519	3565	762	700291	1135
TOTAL	285369	133060	39654	20926208	44059
AVERAGE	9512	4435	1322	697540	1469

Table 2: Students interactions after shifting to fully online because of COVID 19 virus

Date	Logins	Assess- Ments	Discu- Ssions	Documents Viewed	Session Launched
9-Mar-20	11062	3904	857	700517	4964
10-Mar-20	11154	4261	832	700720	4751
11-Mar-20	11015	4122	774	700844	4445
12-Mar-20	6991	3913	730	700916	1127
15-Mar-20	11572	5304	1533	701191	4668
16-Mar-20	11546	5876	2254	701372	4277
17-Mar-20	11723	7731	3448	701566	4098
18-Mar-20	11866	10371	12044	701779	3997
19-Mar-20	9519	8334	1356	702756	927
22-Mar-20	12342	13673	1576	702663	3591
23-Mar-20	12521	18130	2094	702886	3814
24-Mar-20	12389	15181	2137	703062	3129
25-Mar-20	11926	13674	1891	703150	3201
26-Mar-20	10602	14170	1856	703307	818
29-Mar-20	12102	9889	1747	703611	3269
30-Mar-20	12076	7960	1647	703772	3408
31-Mar-20	12027	9635	2482	703934	3207
1-Apr-20	11568	6711	1375	703979	3100
2-Apr-20	10964	6921	1483	704045	793
5-Apr-20	11725	10981	1193	704124	2811
6-Apr-20	11638	10046	1130	704150	3058
7-Apr-20	11419	10436	1672	704202	2828
8-Apr-20	11418	9655	1803	704251	2909
9-Apr-20	10161	11477	2075	704288	739
12-Apr-20	10780	10316	945	704381	2429
13-Apr-20	10485	7330	754	704464	2951
14-Apr-20	10722	9318	1096	704479	2452
15-Apr-20	10676	11643	729	704536	2407
16-Apr-20	9657	12656	502	704568	612
19-Apr-20	9162	10199	289	704620	3751
TOTAL	332808	283817	54304	21094133	88531
AVERAGE	11094	9461	1810	703138	2951

Table 1 reveals real data from the learning management system for 30 days before the closure of the university because of the spread of the COVID-19 virus. It shows the daily numbers for students' logins to the system, daily conducted assessments, daily discussions, and documents viewed by students through the system. It further points out the numbers of synchronized virtual classes lunched daily.

Similar to table 1, table 2 points out students' interactions with the same tools in the learning

management system but for the 30 days during the period for the shifting to fully online because of COVID 19. For more clarification, a comparison between the data in table 1 and table 2 is illustrated in table 3 along with the percentage of the change. The findings based on the analyzed data that emerged from the previous tables will be discussed in the next section.

Table 3: comparison between students' interactions with Blackboard tools before COVID 19 and during the crisis.

	Before	Daily Average	After	Daily Average	% Change
Logins	285369	9512	332808	11094	17%
Assessments	133060	4435	283817	9461	113%
Discussions	39654	1322	54304	1810	37%
Documents Viewed	20926208	697540	21094133	703138	1%
Session Launched	44059	1469	88531	2951	101%

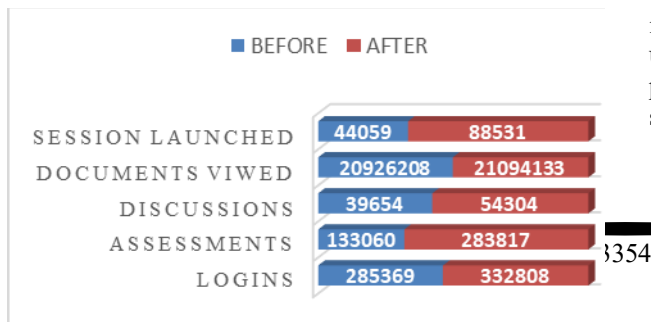
7. DISCUSSION

It is noteworthy that the university courses in the observed semester consist of (3271) sections with a total number of (23772) students including male and female. In addition, there is (33185) course contents upload on the learning management system.

As can be noted from table 1 and 2, the average daily of users' logins for the period before the impact of COVID 19 is (9512) logins. In contrast, a small different with daily average of (11094) logins is noticed for the following period after shifting to fully online. This result, as shown in table 3, significantly indicates that logins increased with only 16% with fully online mode because students are required from the beginning of the semester to use the system as a mandatory policy in blended learning model applied by the university.

However, with regard to the assessments conducted on the learning management system, the findings indicate that the average daily assessment before the pandemic is (4435) while the daily average after the crisis is (9461) assessments which point out important increase of (113%) as shown in table 3. A significant interpretation for this result can be drawn from the university policy whereas on-campus assessments were suspended and alternative methods, such as the blackboard system, were put in place to assess learning outcomes.

Figure 2: Average usage of Blackboard tools before and after COVID 19 crisis



discussed. Table 1 reveals that there were (39654) discussions conducted during the (30) days before the COVID 10 crisis with a daily average of (1322) discussions. Similarly, table 2 points out that the total discussions for the following period is (54304) with a daily average of (1810) discussions. Taking into account the different circumstances between the two periods, it can be concluded that taking the advantage of the adopted and utilized technology helped the university to immediately remain the educational process as normal with positive impact of the educational technology.

The obtained data from the learning management system as in table 1 and 2 outline clearly the lack of a difference between the quantity of documents consumed by the students before and after COVID 19 pandemic. More specifically the daily average of the document viewed before the crisis is (697540) and the average after the crisis is (703138) views. This finding illustrates that use of technology before the crisis help students to continue their study as normal with no negative impact.

With regard to the virtual classes conducted through Blackboard Collaborate, the results shown in table 1 and 2 demonstrate that the total number for the sessions conducted during the (30) days before the crisis is (44059) while the total number of the sessions conducted after shifting to fully online is (88531) virtual classes with a significant increase of (101%) as shown in table 3. This result can be clearly understood, since the university applied blended learning method where is in the normal situation (50%) of the classes delivered face-to-face while (50%) delivered virtually and a policy was made after COVID 19 to transform all face to face classes across the entire university to virtual classes. Moreover, this result evidently indicate that the use of technology help the university to immediately activate for the crisis plan without any negative impact on the lectures' schedule.

The results of this research reflect some of the literature findings regarding the advantages of technology integration in education. More specifically, Brown [12] Dermentzi and others [13], and Hung and Yyen [14], indicated that technology can positively assist both students and teachers in various educational processes. However, the most important issue is how the educational technology being used. Manca and Ranieri [23] indicated that technologies have been oversold but underused. As evidenced from the data analysis in this research, the effective use of technology before the crisis positively impact upon smooth continues of the educational process.

8. CONCLUSION

COVID-19's spread has resulted in thousands of schools, universities and colleges shutting down across the globe. A study was undertaken to explore how technology can mitigate the impact of COVID 19 on education. This was undertaken by using Saudi Electronic University as a single case study approach. SEU was chosen since it adopts blended learning method which helps answer the research question and provide evidence on the use of technology and how it helps the university overcome the COVID-19 pandemic. Analysis of the results indicates that the implantation of educational technology in an effective way can facilitate the shifting to fully online in such crisis. Educational processes can be sustained by the use of technology. It was evidently that the use of technology helped the university to immediately activate for the crisis plan without any negative impact on educational processes.

It can be said that ICTs have made instruction and learning easier and more accessible in different situations. Students become more interactively involved and engaged when technology is used in the learning process. Technology plays a vital role to play in the response to Covid-19 in cushioning the impact on education as the pandemic persists. A time of crisis is also an opportunity for all education systems to look into the future, adjust to possible threats, and build their capacity.

It is noteworthy that this research has been limited on single case study. It definitely will be preferable if the study would have covered several universities and educational institutes in order to enhance the plausibility and reliability of the results. However, investigating additional case studies would not have allowed the deep level of

analysis that has been applied in this study. Future research could include the examination of technology implementation in other institutes to help generalize the findings of how educational institutes best apply technology.

ACKNOWLEDGMENT

The author would like to thank the Deanship of Scientific Research at Saudi Electronic University for funding this research (ELI-CAF 20107).

GLOSSARY

COVID 19	Coronavirus disease 2019
SEU	Saudi Electronic University
ICT	Information and Communication Technology
IS	Information System
E-learning	Electronic Learning

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