

Impact of COVID-19 on performance of college and university graduate students: Implications for science education

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ABSTRACT

The aim of this study is to investigate the impact of COVID-19 on the academic performance of colleges and Kotebe Metropolitan University students in terms of the Internet access, resource availability, and students' perception of e-learning. The study also described the concerns of students, parents, and teachers related to the circumstances caused by social isolation and the perspectives of teachers and parents with regard to remote or online learning. This study adopted a mixed research design. For data collection, survey questionnaires, which were conducted on a total population of n=350, and semi-structured interviews were used with department heads and stream heads. In addition, simple random sampling was used for all instructors from the college, university, and students from the college of teachers' education. According to the study's findings, there was a lack of the Internet access, a lack of ICT resource availability, and a lack of online competency among students and teachers throughout the epidemic. The findings of this study confirm the readiness and motivation of teachers to advance their knowledge and skills, as well as to contribute with the aim of improving the quality of education. The findings also confirmed that COVID-19 comes with both challenges and opportunities for the Ethiopian education system.

Keywords: COVID-19, challenges and opportunities, online learning, remote learning

INTRODUCTION

The rapid spread of the COVID-19 pandemic has caused each sector of human life to instantly feel its impact. The speed at which it has spread has left little or no literature out there directly associated with medical studies as a result of education. Studies in education rarely include the effects of disease on the effective delivery of education to learners all over the world (Hopman et al., 2020; Kraemer et al., 2020).

Medics and economists are working on ways of managing the impact of this epidemic on the country's economies as a result of businesses closing down for days and there being restrictions on human quality (Kraemer et al., 2020). The COVID-19 outbreak that seemed to be within the Chinese Region of Wuhan astonishingly unfolded so quickly across China and different elements of the globe (Wickramasinghe et al., 2020). The government of the Federal Democratic Republic of Ethiopia has begun worrying and taking measures in situ that will stop any kind of COVID-19 natural event within the country.

Medics and economists are working on ways of managing the impact of this epidemic on the country's economies as a result of businesses' closing down for days and there being restrictions on human quality. Ethiopia's Ministry of Health in Ethiopia has proclaimed the deaths of 4,274 COVID-19 victims, 253,634 recovered, and 16,991 in quarantine out of the reportable over 274,899 cases. This justifies the government's abrupt closure of all higher educational institutions and schools around March 20, 2020. The government has up to now managed to contain the unfolding of COVID-19 with timely intervention measures that included restricted flights from outside.

The closure of universities, colleges of teachers' education, and schools was a positive response by the government to shield youngsters from the attainable risks of COVID-19 as a result of educational institutions. Universities and colleges are places, where many students meet, and this makes them dangerous places, where sickness will quickly spread. Several low and middle-income countries have lamented the devastating economic effects that will go along with COVID-19.

The aim of this study was to report on the views of lecturers in mathematics and science on the possible effects of COVID-19 on science and mathematics education (SMED) and the performance of students in SMED subjects. This study is so vital in that it provides information to the Ministry of Education to intensify its readiness to contain the effects of COVID-19 on the education system. It is also crucial because the results might be utilized by educationists in different contexts in their plans to organize to

combat the effects of the epidemic on their own education systems. The study is additionally important to educational research because it contributes valid and vital literature to the sector of SMED that researchers may use to support future studies.

Ethiopia operates a two-semester education system for all educational institutions. Planned activities that have an effect on the higher education institution and the college of teachers' education calendar embody sporting activities like soccer and volleyball that are sometimes available for a term. Unplanned events embrace health-connected occurrences like COVID-19 that force the government to shut educational institutions so as to avoid wasting life.

The government of Ethiopia has closed all academic institutions and inspired all citizens to self-isolate to regulate the spread of an epidemic called COVID-19. This closure meant university or college-going kids lost close to eight weeks of learning time in term two (semester II) of 2020, with the re-opening date not notable. The impact of this epidemic can be powerfully felt by graduate students in consecutive unknown years.

The preparation of students for examinations has been adversely affected by the country's wide self-isolation. Graduate students who were working on their thesis during the second semester were also affected by the loss of contact hours (Oyinloye, 2020). For the Federal Democratic Republic of Ethiopia, which has been recording low pass rates in SMED subjects (biology, chemistry, mathematics, and physics education), the consequences of COVID-19 could possibly have an effect on the rollout of SMED course of study.

Statement of the Problem

The spread of COVID-19 has additionally caused worry, anxiety, and varied considerations among citizens around the world. In addition, requests for shifting teaching to online format have also been reported to extend the level of stress and anxiety among teachers and students. Such concerns are reported specially by countries that declared a very low-level use of classroom technology prior to the current circumstances (Zhu & Liu, 2020).

In fact, the standard of pre-university and higher education in Federal Democratic Republic of Ethiopia and also the deficient level of technology integration into teaching processes are obstacles within the implementation and advancement of the online learning process within the country. However, there are no elaborated evaluations of the factors associated with the implementation of online or remote learning from the angle of teachers, students or beneficiary parents since the start of the implementation of this approach to learning in Federal Democratic Republic of Ethiopia. However, factors associated with the quality of education, technology use, and classroom integration as yet has enclosed studies from varied worldwide researchers. Existing findings from previous analysis inside the field of scientific discipline and education make sure that factors related to education quality and technology use can influence the shift of traditional system from ancient (face-to-face) to remote learning (online learning).

Furthermore, it is vital to acknowledge these factors, together with the importance of technology on the training processes and factors associated with teachers' motivation for work and resistance to alter, and additionally to spot obstacles faced by beneficiaries and education implementers. Support by educational institutions has been the quality to advance the standard of the education system in adapting educational policies and teaching methods to support the learning of students and also the work of teachers, enhance cooperation with parents, and support all of the above-mentioned parties in being active members of change still as supporting their successfulness. To handle this gap, the aim of this study is to investigate and describe the concerns of students, parents, and teachers regarding the circumstances resource and the Internet accessibility, skill to use ICT accessories caused by COVID-19 and the perspective of teachers and parents in regard to remote or online learning.

Research Focus

The goal of this research was to identify the challenges and opportunities facing Ethiopia's education system as a result of the COVID-19 pandemic, as well as to identify educational policy options that could shift the educational system from face-to-face to online learning while adhering to the outbreak's principles.

Research Aim and Research Questions

The purpose of this study was to investigate the impact of COVID-19 on the performance of college and university graduate students in Ethiopia and its specific objectives were, as follows:

1. To identify the perceptions of students toward e-learning during the COVID-19 pandemic at colleges of teachers education and Kotebe Metropolitan University.
2. To determine the skill of using the Internet and the accessibility of college and university students, instructors, and parents during the COVID-19 pandemic.
3. To examine the achievement of graduating students on e-learning mode of leaning during the COVID-19 pandemic at both colleges of teachers education and Kotebe Metropolitan University.
4. To assess the contribution and challenges of COVID-19 on the Ethiopian education system for policy-makers, curriculum designers, researchers, teachers, and students.

RESEARCH METHODOLOGY

General Background

This section describes the methodology adopted in this research and the various techniques utilized for gathering the necessary data. It also focuses on how the primary and secondary data are collected; it details how respondents select and how the research concept is operational in order to answer the research question. The scope of this study was restricted to three colleges of teachers' education in Oromia Regional State and Kotebe Metropolitan University that have been engaged in the learning teaching process. The data was collected through survey questionnaires and semi-structured interviews.

Scope and Sample

The sample size for the study was selected at 342 for survey questionnaires and seven for interview questions. Regarding the sample of students, out of 195 planned, 160 were achieved, which expressed 82.10%. With respect to instructors, out of 189 planned sample size, about 148 respondents were involved, and among students' parents, 34 respondents were involved in the research. Generally, the total achievements of the involvement of selected respondents were about 76.13%. The reason for the lower achievement of the involvement of the selected sample size was the lack of the Internet and resource accessibility due to the impact of COVID-19 online response for the survey questionnaires.

Research Design and Method

Research design is the logic or plan of research that throws light on how the study is to be conducted or if it is a plan for a study, providing the overall framework for collecting data (Creswell & Creswell, 2018). This study used sequential explanatory mix methods design, where the researcher first conducts quantitative research, analyzes the results, and then builds on the results to elucidate them in more detail with qualitative research. It is thought-about explanatory as a result of the initial quantitative data results being explained more with the qualitative data (Creswell, 2017). It is considered sequential as the initial quantitative phase is followed by the qualitative part. This type of design is widespread in fields with a robust quantitative orientation (hence the project begins with quantitative research), but it presents challenges of distinctive quantitative results to explore and, therefore, unequal sample sizes for each phase of the study (Harvard, 2020). This study consists of two distinct phases. In the first phase, the quantitative, numeric data was collected by using questionnaires. In the second phase, qualitative data was collected through semi-structured interviews.

The research method may be a strategy of enquiry that moves from the underlying assumptions to research style, and data collection. For the topic "Impact of COVID-19 on the performance of college and university students in the Ethiopian education system: Implications for science education," a mixed kind of paradigm has been used with pragmatism world views. The analysis has utilized the particular strategies or procedures of research like literature reviews, data collection through survey questionnaires, interviews, data analysis, and interpretation.

Sample Size and Sampling Techniques

The primary goals of sample size determination are to achieve both desirable accuracy and a fascinating confidence level at the lowest possible cost. Therefore, a sample size, which might represent the total number of students, instructors, and parents from both colleges of teacher education and Kotebe Metropolitan University on one hand, and wherever the cost work can be undertaken with minimum value (Omair, 2014). As a result, a sample size of 342 sample population (160 students, 148 instructors, and 34 parents) and five department heads (biology, chemistry, computer science, mathematics, and physics) from the college of teacher education were determined for the specific study based on the characteristics of the target population such as homogeneity on certain conditions and variability in some other situations of the population. Convenient sampling techniques are employed by the parents of the students selected from Assela and the national capital administrative city, and a purely sampling technique has been used for the students of Kotebe Metropolitan University, attributable to the fact that these students were accessible online throughout the COVID-19 pandemic through emails.

Instrument of Data Collection

This study has been undertaken using a mixed type of research design framed in terms of semi-structured questions framed in terms of words (qualitative) and numbers (quantitative). The majority of the questions used were close-ended questions (quantitative survey questions) and the few were open-ended interview questions that were used to not limit the ideas and opinions of the respondents (Elkatawneh, 2016). Questionnaires were prepared in the form of tables and plain texts and filled in by the concerned college, Kotebe Metropolitan University, Asela, and other administrative cities of students, instructors, and parents, respectively. The open-ended questions (qualitative interview questions) have been prepared and the sample heads of departments from universities and stream heads from college of teachers education were interviewed.

Data Analysis and Presentation

Mix data analysis is a complex process that involves moving back and forth between collected bits of data and abstract concepts, between inductive and deductive reasoning, and between description and interpretation. The analysis does not involve using a set formula like it does with statistical analysis used in quantitative methods. This study used a mixed data analysis strategy, which is similar to how to organize, analyze, numerate, and interpret data.

The quantitative and qualitative raw data are sorted and distinguished prior to analysis. Data cleaning, data coding, and data classification, as well as associated tasks, are carried out. Both forms of data are input into the computer and examined after being

Table 1. Background information of the respondents

Respondents	Sex	Asela College	Bule Hora College	Robe College	Kotebe Metropolitan University	Others	Total	%
Students	M	14	15	18	19	-	66	19.30
	F	26	20	24	24	-	94	27.50
Instructor	M	29	14	33	58	-	134	39.20
	F	1	1	2	10	-	14	4.10
Parents	M	7	-	-	13	6	26	7.60
	F	1	-	-	7	0	8	2.30
Total		78	50	77	131	6	342	100.00

Table 2. Perception of colleges & university students in using e-learning during the COVID-19 pandemic

Perception	Descriptive statistics		
	n	M	SD
I like using e-learning for biology/chemistry/mathematics/physics courses.	160	2.68	1.06
I think the teacher's application of e-learning in teaching science helps me improve my skill in science.	160	3.86	.602
I think the teacher application of e-learning in teaching science courses is not useful.	160	2.01	.958
I think my grades will improve by using e-learning for science courses.	160	1.89	.988
I find science courses easier when the teacher uses e-learning in teaching.	160	2.89	.997
I hope teachers of science continue due to the COVID-19 pandemic to use e-learning in their teaching.	160	2.69	.644
Using e-learning for science courses is more interesting than traditional method.	160	2.53	1.00
E-learning make me more interested in learning science and mathematics courses.	160	4.27	.814
By using e-learning for science & mathematics courses, opportunity of interaction with the teacher is enhanced.	160	1.94	.871
By using e-learning for science & mathematics courses, opportunity of interaction with classmates is enhanced.	160	1.73	.445
Using e-learning for science & mathematics courses encourages me to continue learning on the Internet by myself.	160	4.18	.994
I am unwilling to learn science & mathematics courses through using e-learning.	160	3.19	1.33

obtained from various categories of responders (students, teachers, department leaders, and stream heads). The data is then collected, properly structured, and displayed as tables, figures, pie charts, and bar graphs using SPSS (statistical package for social sciences).

RESEARCH RESULTS AND DISCUSSION

Demographic Characteristic of the Respondents

Table 1 reveals that the respondents that involved in the study can be categorized in to college and university students, instructors, and parents that can be found in Addis Ababa, Oromia and other regional state of Ethiopia. Regarding the sex of the respondents, 94 (27.50%) was the female student found and 66 (19.30%) male students in college and university. This implies there are higher female students involved in the study than male students. In regards to the sex of instructors from both college and university 134 (39.20%) were male instructors and 14 (4.10%) female instructors were involved in the study. This means that the majority of the male instructors are involved in the study than the female instructors. Finally, among the parents of the student, they were involved from Assela Town, Addis Ababa and other city out of Oromia and Addis Ababa. Overall, about 342 respondents were participated on the impact of COVID-19 on performance of college and University students in the academic year of 2020.

Perception of College and University Students on E-Learning

Table 2 reveals that most of the criteria for perception of college and university students', only four out of 12 criteria were supported on e-learning of SMED in learning. These accepted criteria of the students described by their mean values were the application of e-learning on science and mathematics (mean [M]=3.86, standard deviation [SD]=.602), e-learning make student more interesting in science and mathematics (M=4.27, SD=.814), e-learning encourages both college and university student on their learning by themselves (M=4.18, SD=.994) and the students were unwilling to learn science and mathematics through e-learning (M=3.19, SD=.133). This implies that using e-learning was acceptable as a one way of instruction of learning-teaching process and if it applied in appropriate ways, which mean students and teachers have skill to use information technology and they have access to get the Internet in a good manner as e-learning is an interesting way of teaching students during the COVID-19 pandemic seasons. In regard to the remaining criteria of perception of the student on e-learning of SMED at both college and university level, the mean values of the respondents were below three, which was unaccepting of e-learning on SMED as a way of teaching students during the COVID-19 pandemic. This might be due to the science education need more practical and hands on activities.

Among the criteria that have been unaccepted on e-learning on the science and mathematics by both colleges and Kotebe metropolitan university were e-learning for science and mathematics encourage students (M=2.68, SD=1.060), grades of the students in using e-learning improves (M=1.89, SD=.988), science and mathematics courses are easier when using e-learning (M=2.89, SD=.997), e-learning for science and mathematics is more interesting than traditional methods (M=2.53, SD=1.000) and so on.

Table 3. Resource & the Internet accessibility of both students & instructors

Questions	Responses	Frequency	Percentage (%)
Do you have adequate access to internet facilities on your institutions/campus?	Yes	110	68.75
	No	50	31.25
	Total	160	100.00
What medium do you use to access the internet?	Handset/smartphones	122	76.25
	University cafe	18	11.25
	Cafe outside university	14	8.75
	Modem & laptop	6	3.75
	Total	160	100.00
During the pandemic of COVID-19 Pandemic do you get internet access?	Yes	22	13.75
	No	138	86.25
	Total	160	100.00
What type of learning lessons are forwarded from your university?	Word documents	15	9.40
	PDF documents	65	40.60
	PPT documents	56	35.00
	Animation document	7	4.40
	Video/audio documents	6	3.80
	No documents	11	6.80
	Total	160	100.00

Resource and the Internet Accessibility of Both Students and Instructors

Table 3 shows that regarding the Internet accessibility about 110 (68.75%) of the respondents have the Internet access in their respective college and university during the pre-COVID-19 pandemic and during the COVID-19 pandemic season 138 (86.25%) students have no internet access at their homes and their living areas. This implies that the Internet accessibility during the COVID-19 pandemic students have no internet access to attend their learning through e-learning or online learning from different web sites particularly from college and university platform.

Regarding the accessibility of resources that used to attend their learning during the COVID-19 pandemic, about 122 (76.25%) of the student were attended their learning by using their smart phones or their friends smart phones and a few of the students access the internet from the café outside their educational institutions or the Internet centers. This implies that the majority of the students need smart phones to attend their online learning during the COVID-19 pandemic. Finally, the type of learning lessons that have been forwarded by their teachers from their respective educational institutions were 40.60% of PDF version and 35.00% of PowerPoint versions lessons formats. However, it is difficult to download such type of learning lessons through their smartphones due to the lack of the Internet access and it asked the budget for charging their mobile to attending online (e-learning). This implies that without the accessibility of resources and the Internet it is difficult for the students to attend e-learning in the respective colleges of teachers' education and Kotebe Metropolitan University and even in Ethiopian context. The Internet access and the ICT material availability in Ethiopia even in Africa were very low and expensive. Thus, the Ethiopian Government will be designed the new insight on the Ethiopian education system out of the normal educational system like during the COVID-19 pandemic and other pandemic diseases.

Regarding instructors of both colleges of teachers education and Kotebe Metropolitan University 59.50% have no internet at their homes and 52.00% of instructors were disagreed that the majority of the student did not get the forwarded materials because majority of their students were lived at countryside at which there was no internet network at all. 64 (43.00%) of the instructors during COVID-19 pandemic used their smart phones and 28.4% used modem and laptops to use the Internet. And finally 54.70% instructors have no educational medium (ICT materials) that have been afforded from college/University. This implies that to be facilitated the online learning (e-learning) during COVID-19 college/university should fulfilled ICT materials for instructors in helping their students in respective manner.

With respect to parents, during college/school/university lockdown they helped their children 50.00% taught from their textbooks, 17.60% by buying educational materials and only 17.60% of parents helped their children in online learning. This implies that parents were no more aware in helping children in using the Internet. 50.00% Of the respondent parents were did not afforded ICT materials for their children and only 32.40% of parents were bought smartphones in helping online learning.

Skill in Using Technology (Use the Internet for Academic Purpose)

The data on **Table 3** shows that majority of the college and university students were 102 (63.75%) use the Internet for academic purposes and the remaining students did not use for such purposes. Most of the student both at college and university used the Internet for academic purpose when they have an assignment 72 (45.00%) and 35.60% of them used the Internet two-five times a week. This showed that students were initiated to use the Internet when there was an assignment and a group work for the course given in the semester. Furthermore, during the COVID-19 pandemic students at both college and university agreed that 82 (51.25%) using the Internet improves the academic performance of the student in SMED. On the other hand, 78 (48.75%) responded that using the Internet did not improve the academic performance of the students in SMED. From the above responses of the students one can concluded that the use of the Internet during college and university lockdown the academic performance of the students may or may not improve. This mean that students were unable to decide the academic performance in science and mathematics in using the Internet for e-learning or online learning due to uncertainty on the day of reopening college/university.

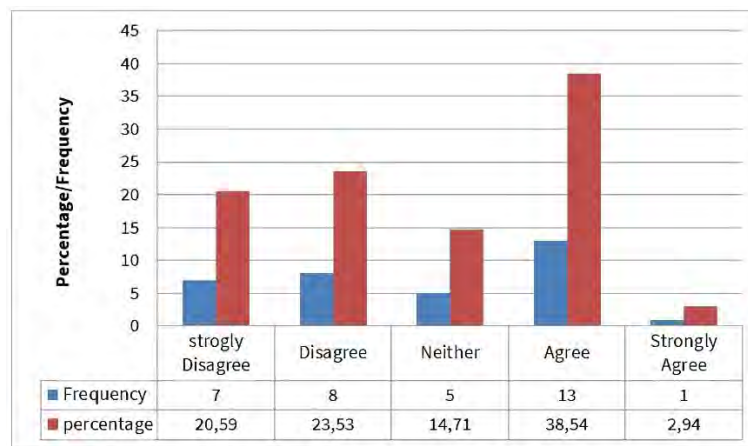


Figure 1. Perception of parents on skill of children in accessing learning materials

In addition, students both from colleges and Kotebe Metropolitan University access educational materials 70 (43.75%) by using their smartphones and copy from their classmates. This implies that if students have no smartphones they did not get educational materials that have been forwarded from their respective colleges and university.

Regarding skill to access the Internet among the students from two educational institutions 104 (65.00%) have got access and the remaining 35.00% did not have skill in finding educational materials using the Internet. And the type of skills that students were used for learning were 70 (43.75%) of downloading the materials and 78 (48.75%) of chatting through Facebook accounts and other means such as responding through emails with teachers and navigating the web sites. Finally, both college and university graduating students of 2020 academic year were 88 (59.50%) have no access to get educational materials that have been forwarded from college/university platform. This implies that due to different reasons students were not attended their learning during college/university lockdown due to the COVID-19 pandemic.

Regarding skill of instructors during the COVID-19 pandemic, about 67.60% of the instructors have skill to access the Internet from college/university platforms. The learning lesson types that can be sent by instructors during the COVID-19 pandemic for students were word, PDF, PowerPoint, and video/audio documents. The main document type that can be forwarded to the student was the PDF formats. During the COVID-19 pandemic, even if there is a need of training for instructors in how to use college/university platform in sending the document there was no training that supported instructors. This showed that some of the instructors were unable to send the documents for the students due to lack of use of the Internet skills.

From **Figure 1**, 58.83% of the respondent parents were disagreed or undecided whether their children access the learning materials that forwarded from their respective colleges of teachers' education and Kotebe Metropolitan University. This showed that parents did not support children during COVID-19 in their e-learning. In contrarily, about 41.17% of the respondents of parents were agreed that their children accessed the learning materials from their educational institutions during college/ university lockdown due to the COVID-19 pandemic. Overall, parents were the community that should participate in supporting their children's online or e-learning in fulfilling the ICT materials during such pandemic.

Impact of COVID-19 on Learning Science and Mathematics Education

Table 3 reveals that improving academic performance of college and university about 64.40% students expected the improvement of their academic performance in SMED. On the other hand, 39.25% of instructors were agreed that the academic achievement of the graduating students improved on online or e-learning mechanism of learning. In addition, both the instructors and students were obtained educational materials that have been forwarded from their educational institutions during the COVID-19 pandemic lockdown. Teachers agreed that 18.90% got educational materials and 51.25% of students also agreed that they have obtained educational material partially that sent from their college and university.

The means of communication between instructors and students during COVID-19 pandemic was through phone, email, Facebook, telegram, and through representative. The most common means of communication for students and instructors were 45.00% and 54.10% through telegram, respectively. This implies that communicating through telegram by using college and university platform facilitate learning-teaching process through e-learning on both science and mathematics subjects. Generally, both college and university students and instructors agree that there was a low performance of the student on science and mathematics subjects during the COVID-19 pandemic, and lack of accessing educational materials due to shortage of the Internet access and lack of ICT infrastructure through the country. Therefore, there was a lack of communication between the students and instructors due to the preventive mechanism of COVID-19 like social distancing and isolation at home.

Table 3 reveals that the comparison between online (e-learning) and traditional way of teaching/learning 50.00% of the instructors were disagreed that online learning mechanism did improved the academic performance of the graduating students in science and mathematics. Moreover, 10.80% of the instructors unable to decide whether the online learning improves or not and 39.20% of the instructors agreed that the academic performance of graduating students from both college and university improved through online learning. From this obtained data one can concluded that if there was an access of resource and the Internet is sufficient at their living areas online learning ways improves the academic performance of the college and university students rather than traditional ways in science and mathematics subjects. On the other hand, 64.70% of parents of the student

disagreed that online learning way improved the academic performance of college and university students during the COVID-19 pandemic. Furthermore, 17.20% of parents were unable to decide whether online learning way improves academic performance of the students and 17.60% of the parents were decided that online learning ways improves the performance of the students as compared to the traditional way of learning in science and mathematics subjects.

In conclusion, the COVID-19 pandemic put a negative impact on the academic performance of the students, the way of learning and the psychological readiness of the student for learning due to lockdown of college and University. Moreover, 79.10% of the instructors from both colleges of teachers' education and Kotebe Metropolitan University agreed that due to the COVID-19 pandemic the Ethiopian teachers and students way of teaching and learning respectively changed from traditional way of learning to online learning (e-learning) ways. But this needs a policy reforms from Ministry of Science and Higher Education of Ethiopia.

Challenges of COVID-19 on Ethiopian Educational System

Here are the challenges both in college of teachers' education universities across Ethiopia are facing because of the COVID-19 outbreak. These are discussed below, as follows.

Shifting from face-to-face to online classes

Universally, many teachers and students are excited by the move to the online delivery mode. Colleges and Kotebe Metropolitan University have already begun preparing lesson plans to deliver online teaching to their students. Online teaching is not a new mode of delivery for any college and university. Many faculty members get training to use online learning platforms either as the only delivery mode or as an add-on to face-to-face teaching (Lim, 2020). Nevertheless, there's always an opportunity that some faculty who do not seem to be techno-savvy will not be able to cope up with this mode. The transition to online mode has raised questions for the school about their capability to deal with the existing technology. Furthermore, computers and IT equipment at home are now in heavy demand from parents, children, and other relatives who need to work from home. Hence, accomplishing tasks at home is going to be a challenging task for the academic institutions. Also, many college and universities do not have enough infrastructure or resources to facilitate online teaching with immediate effect. What about those students who do not have access to laptops and the Internet facilities at home? Is it possible to teach practical and labs, music and art courses online? What is going to happen to those students whose courses cannot be taught online? The quality of online education could be a critical issue that needs proper attention. In this study, there's a lack of ICT resources and the Internet access in college and university or outside of it to undergo online learning on science and mathematics subjects during the COVID-19 pandemic.

Assessment and evaluation of science subjects

Several college and universities in Ethiopia have already suspended the semester-end final examinations, whereas continuous assessment will go on along with the online classes. The transition from face-to face teaching to online delivery incorporates a serious impact on assessments and evaluation. Although technology has been used earlier to support teaching and learning, the assessment aspect is usually under-developed (Timmis et al., 2016). Applying assessments online on those courses designed for face-to-face learning may be a challenging task. Students and additionally faculty are uncertain about the procedure for administrating outstanding assignments, projects, and other continuous assessments (Kearns, 2012; Raaheim et al., 2019). Faculty members must change the assessment types to suit online mode. It is difficult to watch how they're taking it online and to confirm that students are not cheating during online tests. Again lab tests, practical, and performance tests do not seem to be possible to conduct online. In addition, students who do not have an internet facility will suffer a clear disadvantage while participating within the evaluation process, which might adversely affect their grade point averages (GPAs) (Alruwais et al., 2018). This study clearly indicated that there was a problem of assessing online and the times to assess students were also uncertain for both teachers and educational experts at college and university level.

Travel restrictions

The COVID-19 outbreak has created worldwide chaos for transportation that charges double prices. Nations across the Ethiopia are closing local and national borders from region to region or city to city to mitigate the outbreak (Mahardika et al., 2020). University and College administrations are advising their staff members to postpone, until there's a return to normality, participation in any event that might require them to travel overseas (Harvard, 2020). It is obvious that many staff members have already paid conference registration fees and air tickets from study and travel or the other university funds. It gives rise to a state of confusion among the staff while coping with such situations. Universities across the world are asking international students to not travel overseas and continue their studies from hostels. Students' itinerant overseas is positioning themselves at jeopardy of getting sick. Within the context of Ethiopian tertiary education, there was no travel for student to college/university so as to share their learning teaching process due to principles of COVID-19 pandemic like social distancing and isolation at home or quarantine.

Mental health

The COVID-19 outbreak has disrupted the lives of many people across the globe particularly in developing countries like Ethiopia. The universal speedy growth of disease-ridden cases has twisted a way of hesitation and disquiet about what's visiting happen. It is also caused an incredible level of stress among the college and university fraternity, inclusive of students. This stress may result in unfavorable effects on the learning and psychological health of students (Al-Rabiaahab et al., 2020). International students staying far from home do not seem to be only worried about their health, safety, and education but they even have a huge number of concerns for the wellbeing of their families (Zhai & Du, 2020). Questions arise: Are college and universities taking proactive measures to support the mental health and well-being of students? Do college and universities have professionally

trained counselors who can understand such students? Students who managed to go home are worried about being unable to return to their respective institutions for further studies.

The COVID-19 pandemic may have a serious impact on the careers of this years' college and university graduates. They're experiencing major interruptions in teaching and assessment within the final a part of their studies. They will likely graduate late because of the postponement of the final examination. Further, the graduates are going to face the severe challenges of the worldwide recession caused by the COVID-19 crisis. This study revealed that several students were techno addicted if there was an access of the Internet if appropriate care is not given by care givers and parents. To mitigate such problems of students' parents should arrange hard copies of learning materials and follow up accordingly.

Support services from colleges and universities

Colleges and universities should establish a task force to plan and deal with the crisis that's driven by COVID-19. The task force should include members from different areas within the university and college like academics, human resources, facility management, health units, student affairs, enrolment services, and other relevant members. The task force should frequently meet with various subcommittees formed for the outbreak and make informed decisions because the situation evolves.

Due to the rapid increase of COVID-19 cases worldwide, college and universities should cancel or postpone all events, sports, workshops, conferences, and other activities for an indefinite period of your time. They should avoid or reschedule meetings involving large numbers of staff or students unless it is urgent. Rather than physical meetings, they ought to try, and conduct Zoom meetings.

It is the proper time for faculty, students, and administrators to learn from this critical situation and to beat these challenges. Online learning may be a greater opportunity as results of this crisis. Students are young and energetic, and that they are capable of learning through the online platform. Faculty can inspire the younger minds and enticement them into energetic involvement. University authorities should encourage students and faculty to remain connected through the online or any social media platform and move forward together during this extremely difficult time. Students should be given course instruction and other services in an online format to support academic continuity (Gewin, 2020). The training program should be organized as quickly as possible for the faculty members to tackle the online learning platform (Lim, 2020). This force experimentation will guide college and universities around the world to upgrade their technical infrastructure and make online a core aspect of teaching and learning.

Students are concerned within widespread fears that the outbreak will adversely affect their exam performance. Clear directions should tend to them regarding the procedures for administrating mid-term exams, assignments, and projects (Lim, 2020). Faculty members, with the respective heads, should frame a versatile assessment guideline to stay in mind that students are not at a disadvantage. If any student is not able to attend a course online because of illness or any disturbance, college and universities should remain as flexible as possible to confirm that he or she will not acquire any destructive effects in terms of grading. Some courses, like labs, fine arts, dance, art, and music, cannot be taught online. In such cases, the faculty can simply grade students on the work they need already done or suspend classes until things become normal. Therefore, in SMED it is difficult to assess students in online way particularly for the lab sections and practical works. This can be the good for college and university students, who are graduating within the academic year of July 2020.

The main aim of this study is to investigate the impact of COVID-19 on the performance of colleges and Kotebe Metropolitan University and to narrate the challenges and contribution of COVID-19 in both college and university graduating students. Suggestions are also presented in order to guide future researchers examining the impact of COVID-19 based up on the shift from face to face learning or online learning styles and the challenges and opportunities of COVID-19 was assessed.

Opportunities of COVID-19 on Ethiopian Educational System

Regarding the contribution of COVID-19 on the colleges and Kotebe Metropolitan University the following contributions were investigated:

1. Blended learning approaches will be tried, tested and increasingly used.
2. Teachers and educational institutions will receive more respect, appreciation, and support for their important role in the society.
3. Quality teaching and learning material will be better curated and more widely used.
4. Teachers' collaboration will grow and help in improving learning.
5. The COVID-19 crisis will help us come together across the boundaries.

DISCUSSION AND FINDINGS

From the result and discussion and the overall findings of the study the following conclusions are drawn.

The mean values of the criteria assessing the perception of colleges and Kotebe Metropolitan University student on e-learning (online learning) was acceptable and important for theoretical parts of the science portions and ineffective for practical and hands on activities of science and mathematics subjects. On the other hand, e-learning was very good to make these students learning a new scientific phenomenon and theoretical practices from web sites communities independently by Google from different engines.

Generally, during the COVID-19 pandemic students were involved in e-learning particularly the graduating students in order to cover the learning materials that have been forwarded from their instructors on colleges and Kotebe Metropolitan University platforms. The level of the participation of students on the e-learning during the COVID-19 pandemic particularly on the practical science topics was not as such interesting and effective due to the Internet skill and backgrounds of both the students and instructors. For both the students and the instructors that found in educational institutions have lack of the Internet, lack of ICT equipment and lack using the Internet skills to facilitate learning through online during the COVID-19 pandemic in both colleges and university.

Students, instructors and parents were not ready for this pandemic, and they were more frustrated rather to find the solution for the impact of COVID-19 on Ethiopian educational system. This study identified the major challenges and contribution of COVID-19 on colleges and Kotebe Metropolitan University based on the summaries that have been investigated. The identified challenges were shifting instructional methodology from face to face to online learning (online learning) without considering the backgrounds of both the students and the instructors, ICT infrastructures and so on; travel restriction, which ignores the interaction between teacher and students, teacher and teacher interaction, which used to facilitate learning. Additionally, problem on the mental health of students, instructors and even parents were caused by due to stress in stay home and lack of supports from instructors and college and university concerned bodies due to pay attention for protection of the pandemic.

The identified contributions of COVID-19 on colleges and Kotebe Metropolitan University are, as follows: Blended learning approaches was tried, tested and increasingly used; teachers and educational institutions was received more respect, appreciation, and support for their important role in the society; quality teaching and learning material was better curated and more widely used; teachers' collaboration will grow and help in improving learning and the COVID-19 crisis will help us come together across the boundaries.

Recommendation and Implications

The impact of COVID-19 on academic performance of colleges and Kotebe Metropolitan University in SMED depicted that the problems are more prevalent at the resource and the Internet accessibility for graduating students and faced different challenges and obtained a green light from the challenges on their future learning. Therefore, in the light of the preceding findings, discussions and conclusions made, the following recommendations are forwarded.

In general, there was a lack of access to the Internet and shortage of ICT equipment in both colleges and Kotebe Metropolitan University and the online learning instruction faced a great challenge during the COVID-19 pandemic. Thus, the educational institutions (both College and University) should also be possible to make online education accessible to students if they set up an internet café in the area or city, where they usually receive students, such as coronavirus recovery stations.

In most Ethiopian education systems, the education system may be completely or partially shut down in the event of a pandemic such as the COVID-19 pandemic. Therefore, the government or the Ministry of Education should start a blended learning and teaching system. Therefore, the Ethiopian curriculum should include an e-learning instruction in planning B and then after both face to face and online learning instruction in a combined ways in order to assure quality of education during any pandemic diseases.

Colleges and Kotebe Metropolitan University should prepare a training package for both the students and the teachers in an appropriate manner in order to improve their internet use system properly. The training package should combine technology and education theory and their practical activities through virtual teaching-learning process.

The Ethiopian curriculum should be designed considering various epidemics. Because education is the foundation of a country and a better life, it is good that the Ministry of Education is thinking about this and developing a better curriculum.

Researchers, policy makers, policy implementers, and curriculum developers should carried out further studies on electronic-learning methods and face to face learning methods and report the results to the user as much as possible and changed the research results into implementation.

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Ethical statement: Authors stated that all of the research steps discussed in this study began and ended with ethical concerns. As a result, efforts were undertaken from technique selection and design through reporting and dissemination of findings. As a result, the researcher obtained a letter of collaboration from the Kotebe University of Education, the College of teachers' Education, and authorization from the Kotebe University research office in Addis Ababa and four colleges of teachers' education in the Oromia regional state. The study began with consent from four college deans and Kotebe University. Following that, consent forms were distributed to instructors, department heads, and representative parents who stated their willingness to engage in this study. Authors further stated that the form detailed the goal of the study, its advantages, as well as the confidentiality and anonymity of the data obtained. The permission form stated that students were able to withdraw at any time without consequence, and this was rigorously followed in this study. Most critically, data confidentiality (using codes and pseudonyms as needed) is prioritized. While collecting and processing data, the researcher worked to minimize bias and ensured that all conclusions stated were based on the data gathered. To summarize, the allocated codes to the participating instructors and deans of the selected universities were utilized when reporting in this study, and no personal names were divulged in any manner.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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