Online Instruction in Ethiopian Universities: Current practices and future prospects

By

Mr. Tarekegn Tesema

A Final Research Report Submitted to Adama Science and Technology University

Adama, Ethiopia
Augus 2023

Acknowledgements

First, we would like to take this opportunity to thank the almighty God who has given us all the strength to become successful in our study.

Our second and special gratitude goes to Dr. Jeylan Aman and Dr. Zeyin Engidasew, our reviewers, for their critical comments and constructive suggestions they rendered us in our research works.

We would also like to acknowledge with much appreciation students, instructors and department heads of Mechanical Engineering, Computer Science and Chemistry departments of Addis Ababa University, Adama Science and Technology University, Ambo University, Walkite University and Debre Birhan University and academic deans, ICT and Library directors of the universities and Basiliyos Tilahun, ICT expert from Ministry of education. We really thank all of them for their cooperation in giving us necessary information we need for our study.

Finally, we want to extend our appreciation to our friends Fasika Firew and Milkesa Siyoum, ASTU instructors, for their contribution in giving us invaluable assistance in our research work. Likewise, we want to express our thanks to all our friends who came to help us in offering us necessary support in doing our research paper. Thank you all.

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List of Acronyms

EHEIS: Ethiopian Higher Education Institutions

ICT: Information and Communication Technology

IMO: International Maritime Organization

IT: Information Technology

GIZ: German Agency for International Cooperation

JU: Jimma University

MOE: Ministry of Education

PESC: Political, economic, social, and cultural

TVET: Technical and Vocational Education

OECD: Organization for Economic Cooperation and Development

Abstract

Online Instruction in Ethiopian Universities: Current practices and future prospects

Mr. Tarekegn Tesema, Dr. Diriba Eticha & Dr. Amanu Oljira

Adama, Ethiopia, 2023

Advancement of technology and increasing interest from instructors and students has brought the popularity of online instruction in higher educational institutions across the world. Hence, higher educational institutions around the globe have been using this mode of teaching-learning to delivery courses, but developing world including Ethiopia have been encountering various challenges in implementing online instruction. Some local studies have been conducted for the improvement of online teaching and learning, but there is no comprehensive and depth study conducted on online teaching-learning process at national level as the country is at infant stage. Consequently, this study investigates the current practices and future prospects of online instruction in universities in Ethiopia. To this end, descriptive survey design was employed whereby both quantitative and qualitative data were gathered from six universities identified through clustering and purposive sampling techniques. The quantitative data were collected through 5 point Likert scale questionnaire from instructors and students of Mechanical Engineering, Computer Science and Chemistry departments identified through simple random sampling. Then, qualitative data were gathered through semi-structured interviews from an expert of Ethiopian Ministry of Education and universities management on different positions and through focus group discussion from selected students and instructors of the departments under the study. After the analysis, the finding of study shows that online education in Ethiopian universities during the pandemic was partially effective for graduate students and totally not effective for undergraduate students. The main challenges that hindered the effective implementation of online instruction are absence of national wide online education policy, shortage or lack of online infrastructure, lack of pedagogical knowledge and skills of online technology, shortage of ICT experts, lack of bidding system for digital materials, less focus given to online instruction and lack of motivation towards online education. Based on the findings, the researchers suggest that the Ministry of Education should take prime initiative for the effective implementation of online education and universities and instructors should also play their roles in implementing online education effectively. Besides, it is recommended that online education delivery method should be integrated with face-to-face method for its effective implementation in the future.

Chapter one: Introduction

Higher institutions around the world are striving to develop online mode of delivery in order to meet students' needs and challenges. Similarly, in Ethiopia where online instruction is at its infant stage, colleges and universities across the country have begun using this method to offer courses**.** Since the implementation of online classroom is problematic in developing country like Ethiopia, assessment has to be made on its current practice to improve and maintain this mode of delivery in the future. Therefore, this research project is meant to assess current practices and future prospects of online instruction in some selected Ethiopian universities. The study has been conducted on undergraduate and graduate students of the selected universities in the country.

1.1. Background of the study

Online instruction is a form of teaching and learning that occurs as a result of information obtained through an electronic means and that the process may include diverse formats and procedures (Piskurich, 2004). This mode of delivery got popularity in the mid-1990s due to the development of educational technology and increased interest in synchronous and asynchronous discussion groups (Garrison, 2011), and it is considered as a major breakthrough in teaching and learning because it allows learners at distant locations to learn through real-time or asynchronous interaction with their instructors and other students (Hill, 1997; Webster & Hackey, 1997; Singh & Thurman, 2019; Littlefield, 2018). In the recent years, combination of online with face-to-face instruction is getting popularity in higher education institutions around the world (Garrison & Vaughan, 2008; Allen & Seaman, 2010). Thus, educational institutions around the globe have committed their time, effort and resources to strengthen and expand the opportunities of online teaching-learning (Allen & Seaman, 2010).

In attempt to use technology for education quality, in 1994, Ethiopian government also adopted education and training policy which outlined the mission and goals for education system of Ethiopia to achieve national economic and social development goals. In this document, ICT in education implementation strategy and its corresponding action plan are components of Ethiopian national e-education initiatives. The national ICTs in higher institution initiative is one of these main streams that focuses on using ICTs within universities, colleges and research institutions (Hare, 2007).

Based on this, Ethiopian higher education organized ICT manpower and infrastructure and attempted using ICT for education mainly in the area of course management system, library management system and student management system. Ethiopian Ministry of Education has also established online forum that is used to exchange information and resources among universities across the country (Tadese, 2015). Moreover, Ethiopian Higher Education Relevance and Quality Agency (HERQA) has developed new guidelines for quality assurance of distance education and online teaching (Tirussew et al, 2018).

In the meantime, the sudden outbreak of Covid-19 had brought shift of pedagogy from in-person to online classes to continue teaching and learning in education institutions including higher education institutions cross the world (Reimers et al, 2020; Dhawa, 2020 ; Reimers and Shleicher, 2020; Huang et al, 2020). Similarly, Ethiopian Higher Education Relevance and Quality Agency (HERQA) issued licenses for all colleges and universities to give online education for the first time in Ethiopia and drafted guidelines that will enable higher education institutions to teach undergraduate and postgraduate students through this method (Seble, 2020). Following that, higher education institutions started offering courses through online after an announcement had been made by Ministry of Science and Higher Education (Dargie, 2020). It is believed that investigating how universities across the country implemented online instruction was found to be important. Accordingly, this study was to assess the current practices of online instruction in Ethiopian universities and then propose possible way of implementing this mode of delivery in the future.

1.2. Statement of the problem

Though online teaching and learning has gained popularity among both students and teachers in developed countries around the globe (Sarkar, 2016), in many developing countries the use of online learning in higher education institutions are still at a preliminary stage compared to developed nations because they often encounter various problems when they want to implement e-learning in higher education (Sife, et al, 2007). Some challenges that hinder the effective implementation of online education in developing countries are insufficient internet connectivity, limited technology skills, shortage of computer, limited time for online interaction or lack of interaction, lack of incentives, lack of ICT infrastructures and lack of interest for online education (Palvia et al, 2018; Mutisya, 2016; Lamaster & Knop, 2004). Many studies conducted at local level also support that higher Education institutions in Ethiopia encounter similar challenges to implement online education (Yonas, 2019; Tadesse, 2015; Abinew & Worku, 2018; Yenework, 2017; Kumar et al, 2018 & Kassahun, 2014).

On the other hand, other researches indicates that the present approach to teaching and learning environment is inadequate to address and support twenty first century learning needs (Scott, 2015) and online education is popular and becoming more popular and permanent way of learning format for generations throughout their lives. Business organizations for instance understand that in order to be competitive and profitable, they need employees who are learning constantly and the best cost effective way for this to happen is online education (Draves. 2013). As a result, (Kim and Bonk, 2006) approve that the focus of higher education institution in the future is expected on blended learning instruction that combines face-to-face with online method than fully online course. Hence, Zaghdoud (2020) suggests that educational institutions must study and understand the problems of online education and take strategic action in order to create more effective and attractive online teaching-learning environments and platforms.

In line with this, there are some studies conducted on this area at national level, for instance, Yared (2018) conducted on perception and challenges of graduate students on blended learning in Ethiopian Civil Service University, Kassahun (2014) conducted on perception of Jimma University Mathematics students towards e-learning and Kumar et al (2018) conducted on e-learning trends, technologies and case insights of student e-readiness from Ethiopia. The main purposes of these three studies are to identify the perception or attitude of students towards e-learning and challenges of online education. In addition, Yenework (2017) conducted on the assessment of e-learning readiness of Assosa University and Abinew and Worku (2018) conducted on acceptance and use of e-learning systems. The main purposes of these two studies are to identify the participants' e-learning readiness, acceptance and use in universities and find out factors that influence their readiness, acceptance and use. The other studies conducted are E-learning systems success model: the case of some selected Ethiopian higher education institutions by Yonas (2019) and the survey of use of E-learning in higher education in Ethiopia by Tadese (2015). The main purposes of studies are to assess the current status of online education and identify factors that determine its success or challenges that hinder its implementation in universities in Ethiopia. Drave (2013) claims that there are three main elements in online instruction: content, interaction and assessment. However, these studies didn't assess the implementation of online teaching-learning process in terms of provision of online reading materials, interaction of students with the materials, instructors and other students and students' assessment and other related issues.

Another study conducted by Sangheethan et al (2016) was on the effectiveness of e-learning in Ethiopian universities. In this study, data were collected from students to identify how far online education was utilized in teaching-learning process and found out that it was not properly utilized in teaching and learning community. In addition, study conducted by Moges (2021) on digitalization in teaching and education in Ethiopia in which the study explored the current practice, challenges and prospects related to the use and integration of digital technology in education in Ethiopia, and how digital technology was impacting the teaching–learning process in terms of preparing students for a knowledge-based economy. Then, data were collected through documents analysis whereby policy documents and manuals were analyzed and researcher papers were reviewed and through interview conducted with key informants such as ministry of education, the colleges of teacher education, and the Federal Technical and Vocational Education and Training Agency.

Wagner et al (2008) claim that students and instructors, departments, technology providers, content providers, faculty members of higher educational institutions and accreditation bodies who assess the quality of education higher institutions offer are all e-learning stakeholders. Therefore, they should participate in giving information about online education for its future improvement. However, in the study conducted by Sangheethan et al (2016), data were collected only from students where data from teachers and other participants were also important. Regarding the study conducted by Hagos (2019), data were gathered from document analysis and interview made with key informants that are not the direct participants of online teaching and learning process. In supporting this, Beyene (2010; 2006) indicated that the implementation of online instruction in higher education institution is hindered by various factors and limited studies have been conducted to understand its practices. Thus, he suggested that further studies that necessitate different views from stakeholders should be conducted.

For effective implementation of online learning to take place, on the other hand, Martin and Bolliger (2018), and Lear et al (2010) claim that students should actively be engaged in online learning through interaction with content, other students and their instructors. Besides, Draves (2013) claim that heart of online course is the presence of interaction that engages students in learning, not the lecture notes the instructor sends or the delivery that he/she makes. Along with these, students should gain adequate guidance, encouragement and feedback during online instruction. And before online instruction starts, according to Sweger (1996) and Conrad and Donaldson (2004), instructors and students should own equipment like computer or smartphone and skills of use the equipment for

online education. Lee and Hirumi (2004) prove that lack of these skills and knowledge can make students and instructors to experience problem during the implementation.

The scholars' ideas show that assessing the practice of online teaching and learning has to start from training instructors and students for online instruction to assessing students and hence relevant information has to be collected from direct and indirect participants of online instruction. Therefore, as far as the researchers' knowledge, at national level there is no comprehensive and depth study that mainly concerned with online the teaching-learning process whereby data are collected from direct and indirect participants of online instruction.

Accordingly, the current study investigates the current practices of online instruction during the pandemic in Ethiopian universities and proposing possible ways of implementing it in the future. This means that the study attempts to identify whether the universities have effectively implemented online instruction, and if not, point out major problems that hamper its effective implementation. Then, possible ways in which online instruction can be implemented in the future have been recommended. In general, the study investigates how universities have implemented online instruction alleviating challenges that hinder its implementation during the pandemic breakout, what significant steps they have gone through and what should be improved for its effective implementation in the future.

1.3. Research questions

The researchers have come up with two main research questions to assess the current practices and future prospects of online teaching and learning in Ethiopian Universities. The research questions are:

- What is the current practice of online instruction in Ethiopian Universities?
- What are the challenges instructors and students face during the implementation of online education?
- What is the attitude of instructors and students towards online education?
- What is the future prospect of online instruction in these universities?

1.4. Objectives of the study

The main purpose of this study is investigating current practices and future prospects of online instruction in some selected universities in Ethiopia. More specifically, this study is:

- to identify if online teaching and learning has been implemented effectively in the universities.
- to point out the attitude of University instructors and students towards online method of teaching and learning.
- to find out major challenges that hinder the effective implementation of online teaching and learning at universities.
- to propose the possible ways in which online instruction will be implemented in Ethiopian universities in the future.

1.5. Ethical issues

In doing research, research ethics is a core aspect of the research work and the foundation of research design. Accordingly, the following ethical principles were taken into consideration. These are: informed consent, respect for confidentiality and anonymity of research participants, respect privacy, and avoidance of harm to participants. What is more, for concepts and ideas reviewed from relevant literature, proper acknowledgement and citation were made.

1.6. Significance and beneficiaries

The study will have a great significant for various bodies. Firstly, Ethiopian Ministry of Education will use the result of the study in helping universities to effectively implement online instruction. Secondly, the findings of the study will help universities to aware about the implementation of online instruction and provide necessary support that helps the improvement and continuation of online instruction. Thirdly, the study will help students and instructors to have awareness on how to effectively implement online instruction and then play their roles in online teaching-learning process. Lastly, this study could be also used as a reference to other researchers who may for any reasons want to conduct similar research in this area.

1.7. Scope of the Study

This study was confined to investigating current practices and future prospects of online instruction in some selected universities in Ethiopia. The study dealt with online education current practice with reference to undergraduate and graduate students of Mechanical Engineering, Computer Science and Chemistry departments of six universities in Ethiopia during the Covid-19 pandemic.

1.8. Limitation of the study

Firstly, in order to identify whether online instruction is implemented effectively, more reliable information is believed to be obtained if data is gathered through observation while online teaching-learning process is going on. This is because through direct observation, it is possible to get adequate and accurate information on how online instruction was implemented, especially to find out to what extent interaction was taken place during online teaching and learning process, what major effort instructors made for the implementation, major challenges encountered and etc. but in the first place data were collected after the online instruction was over since online teaching-learning process was during the pandemic lockdown and on the other hand it might be very difficult to observe the implementation for each course across all departments and universities under study. Secondly, it would be more appropriate if students from different departments were included as sources of data; however, including all departments takes tremendous amount of time, effort and finance to put into practice. Therefore, the study is limited to Engineering and Natural Science students of some selected universities.

Chapter two: Review of related literature

This chapter includes both theoretical and empirical review of literature. The theoretical review of literature is used to put theoretical framework that helps as a guide for the study while the empirical one is to discuss the previous investigations' findings in order to show gap between the past researches and the present one. Accordingly, both theoretical and empirical reviews of related literature have been discussed in broader sense.

2.1. Definition of e-learning

It is difficult to develop a general definition because different terminologies have been used for online learning. Terms commonly used for online learning are e-learning, Internet learning, networked learning, virtual learning, computer-assisted learning, web-based learning, and distance learning. All of these terms point toward that the learners are at distance from the instructors in which learners use some form of technologies to access the learning materials and to interact with instructors and other learners and they are provided with some form of support (Anderson, 2008).

Piskurich (2004) also defines that online learning is 'any form of learning that utilizes a network for delivery, interaction, or facilitation.' As to this definition the network could be internet, school LAN (Local Area Network) or complete WAN (Wide Area Network) whereby learning could be take place individually guided by computer through synchronous or asynchronous method or combination of the two. Hence, online learning is learning that happens as a result of information gained through electronics method and that the process may include diverse formats and procedures. In the same manner, Singh and Thurman (2019) defines it as learning experiences in synchronous or asynchronous environments using different devices like mobile phones, laptops and so on with internet access. In these environments, students can be anywhere (independently) to learn and interact with instructors and other students. In synchronous method, students are access to learning materials in virtual classroom and make direct oral interaction with their instructors and other students while in asynchronous mode, students are provided with learning materials recorded or text format through different learning management systems and are supposed to interact with the materials and give their suggestions at the time of their convenience via written text.

In addition, OECD (2005) cited in Balaraman et al, (2018) defines online learning as the use of information and communication technologies in diverse processes of education to support and enhance learning in educational institutions.

2.2. Emergence and development of online education

The start of online education traced back to 1960 when Illinois University created an intranet for its students, a system linked to computer terminals where students could get the access of course materials and listen to recorded lectures. In 1984, university of Toronto offered completely online course for the first time and then, electronic university network was established in 1986 with the mission of helping higher education institutions expand the availability of online courses and started offering online education. In the long run, higher education institutions in developed countries across the globe like USA and Europe began offering online education for both bachelor and Master's degrees (Sarkar, 2020). This indicates that online education at the beginning was to make course materials more accessible to students. However, when technology improved, higher learning institutions started to include web-based learning in their curricula, developing online courses for degree programs (Allen and Seaman, 2008).

This mode of delivery then either fully online or combining it with face-to- face got popularity in the mid-1990s due to the advancement of educational technology and increased interest in synchronous and asynchronous discussion groups (Garrison, 2011). Nowadays, higher education institutions across the world have already integrated online learning into their curricula and developed bachelor and Postgraduate programs. Even in USA higher education institutions, the number of students pursuing their education through online outnumbered the number of students attending their education through face-to-face since online learners attend their education without the limit of time and place (Allen et al, 2016).

In the same fashion, higher education institutions across Africa countries are also trying to use this method of course delivery but there are many challenges that hinder its implementation. In order to mitigate the problems, African Virtual University (AVU) was established in 1997 by intergovernmental organization of African countries with a mandate to significantly increase access to quality higher education and training through the innovative use of information communication technologies. The university has developed substantial experience in delivering programs such as certificates, diplomas and degrees through information communication technologies (ICT). In addition, the university has been involved in designing and implementing online learning projects, training instructors for online learning platforms, and providing resources for managing a digital

library. However, the university faces high level challenges like political and economic instability, poverty, and poor ICT infrastructure to mention some out of many (Paygar, 2014).

The author goes on saying this moment, many centers have been opened and the connectivity at the centers has been provided through a two way Very Small Aperture Terminal (VSAT) internet with bandwidth of 128/512kbps but the connectivity of Senegal and Ethiopia is done through the local internet service providers.

Then, the sudden breakout of Covid-19 brought shift of pedagogy from in-person to online classes to continue teaching and learning process in education institutions cross the world including African countries (Reimers et al, 2020; Dhawa, 2020; Reimers & Shleicher, 2020; Huang et al, 2020).

2.3. Online education in Ethiopia

In 1994, the Ethiopian government made an attempt to use technology for education quality, adopting education and training policy which outlined the mission and goals for education system of Ethiopia to achieve national economic and social development goals. In this document, ICT in education implementation strategy and its corresponding action plan are components of Ethiopian national e-education initiatives. The national ICTs in higher institution initiative is one of these main streams that focuses on using ICTs within universities, colleges and research institutions (Hare, 2007).

Based on this, Ethiopian higher education organized ICT manpower and infrastructure and tried to use ICT for education mainly in the area of course management system, library management system and student management system. Ethiopian Ministry of Education has also established forum that is used to exchange information and resources among universities across the country (Tadese, 2015).

Then, an attempt made to use ICT for online instruction in higher education institutions in Ethiopia is the partnership of Curtin University of Technology, African Virtual University and Addis Ababa University. In 2003, Curtin University of technology launched an online learning project in Ethiopia, Kenya, Rwanda and Tanzania with investment of 5 million dollar in partnership with African Virtual University. This project offered first degree program in business by customized the program to local African institutions' education curriculum needs. This was to address problems students faced in accessing to higher level education, problem of high school students dropout and unskilled labor forces. It was also aimed to address the quality of private higher education institutions and isolation

of Africans from global knowledge. In general, it was to meet the increasing demand for access and quality of education at higher education institutions (Hagos, 2019).

Just in 2009, Adama Science and Technology University on started using online learning system-MOODLE as its learning management system (LMS). The university uploaded courses over the system whereby students, instructors and system administrators were registered to use it. At that moment, ASTU ICT center delivered online trial examinations, quizzes, forums and assignments. In 2015, the university signed an agreement with Korea International Cooperation Agency (KONICA) to work on new online learning initiatives by investing on online learning content development, building data centers, establishing labs and studios, training stakeholders and providing necessary infrastructure in order to effectively implement learning management system of the university. However, the online learning initiative is still challenged by various factors (Ketema & Nirmata, 2015).

Other Ethiopian higher education institutions who adopted MOODLE as their LMS to support their teaching and learning process are Addis Ababa University, Jimma University, Hawasa University, Arbaminch University, Ambo University, Haramaya University, Ethiopian Civil Service University, Bahirdar University and PESC Information System College (Hagos, 2019;Ketema &Nirmala, 2015).

Ethiopian Civil Service University in collaboration with GIZ had been also giving short term training to regional public service on course like Capital Investment Plan and Revenue Enhancement Plan through Woreda net video conferencing and face-to-face interaction. Then, the university started delivering some common courses through technology assisted learning programs with the help of online advisors in 2014. Following this in 2015, the university gave training to masters students on how to access online reading materials, quizzes, forum and reading pages at the beginning the semester and offered common courses like Ethiopian public administration governance and Ethics in blended format to the students (Moges, 2021)

In 2009 and 2016, Ethiopian government also formulated and implemented two subsequent policies by providing institutional support for its implementation. The 2016 policy was the updated policy and strategies that considered education as one of its strategic plan for transforming the country economy. This policy was believed to be a document whereby ICT can enhance the education system by providing wealth information and online network and by developing digital skills, thereby enhancing

access to and quality of education, which support human capita development. The latest reform initiative is Ethiopian Education Roadmap for 2018-2030. The roadmap indicates that pre-service teacher should train both on how to use computer and on how to design high-quality, technology enhanced lesson. With this regard, student teachers and teacher educators should get access to ICT infrastructure. However, this education roadmap does not consider that technological innovations and the use and integration of ICT have changed the way knowledge is accessed and delivered. It further disregards to propose the ways in which new technologies could be integrated in the education system to achieve high learning outcomes, to empower young population, bring about social justice and prosperity in the twenty-first century (Moges, 2021).

Meanwhile, the pandemic breakout shifted method of teaching from face-to-face to online method of delivery throughout the world. Then, Ethiopian Higher Education Relevance and Quality Agency (HERQA) issued licenses for all colleges and universities to give online education drafting guidelines that enabled higher education institutions to teach undergraduate and postgraduate students through online (Seble, 2020). Then, higher education institutions offered courses through online after announcement had been made by Ministry of Science and Higher Education (Dargie, 2020).

2.4. Theoretical framework of online learning

Online learning should use merged effective educational theories as opposed to solely using it as an information delivery agent (Derouin et al., 2005). Aderson (2008) also suggests that for effective implementation of online learning the combination of different theories have to be used since a single theory cannot be effective. Therefore, online learning needs to depend on the following educational theories: behaviorist theory, cognitive theory and constructivist theory.

According to behaviorist theory, education is change of behavior of students due to external influences, which can be understood in the response the students give to the external influences. In other words, this theory is grounded in philosophical principles that produce overt, observable and measureable outcomes. The role of teacher is, therefore, to create conducive learning environment for the desired behavior to happen and to eliminate the behavior that is not desired, and the students' role is to actively participate in online learning and bring about change in behavior. Hence, the main focus of this theory is on content, with subject-centered approach. In line with this, students should be told the outcome of the online learning so that they set expectations and judge if they can achieve the outcome. Second, they should be provided with sequentially arranged learning materials to promote

learning. Third, learners must be provided with feedback so that it is possible to check how they are doing and take corrective measures if needed. Fourth, they must be assessed to check if they have achieved the desired outcome (Anderson, 2008).

Concerning cognitive theory, Aderson (2008) states that learning is taken as internal process of information received from different sources and hence students' learning depends on the effort they make in the learning process, the depth of the process, which involves the use of memory, motivation, reflection and thinking. For that reason, in online learning, learning materials should be presented and strategies that allow students to process the materials efficiently must be used. In general, the amount of information transferred from sensory store to working memory and then from working memory to long-term memory is determined by the quality and depth of the processing in memories. ''The deeper the processing, the more associations the acquired new information forms in the memory.''

According to Anderson (2008), in order for deep mental process to happen, students have to be told why they take the lesson, and learning materials should be presented in different modes (textual, verbal and visual) and should contain different activities to meet individual differences and learning styles. Second, students must be provided with pre-instructional questions to activate their prior knowledge that is required to learn the new materials. Third, students should be asked while-instructional questions to generate information in the learning process and allow them to apply the information in the real life, contextualizing learning. Fourth, students should be motivated to learn by telling them the importance of the lesson and what they benefit from it and capturing their attention through pre-instructional activity at the start and maintain that throughout the online lesson. The students also have to be provided with feedback on their performance, given the opportunity to give reflection on what they learn, complete assignments and project work that use real life application and information, collaborate with others and check their progress.

Constructivist theory on the other hand claims that learners learn by interpreting information they gain by associating the information to their personal reality or experience. Thus, they learn best when they contextualize what they have learned to their own view of world for immediate application and personal meaning (Anderson, 2008). In a nutshell, according to this theory students actively participate in learning activities and construct their own new knowledge by assimilating experience they gain with their earlier knowledge (Kassahun, 2014).

In this educational theory, instructors take the role of advising and facilitating while students are allowed to take part in learning process and construct their own knowledge through association of the information they gain into their personal reality (Duffy & Cunningham, 1996 cited in Anderson, 2008). For this association to take place, instructors should link the new information with the existing knowledge (Driscoll & Carline, 2005).

According to this theory, students are expected to actively participate in doing meaningful online activities that need high-level processing resulting in the creation of personalized meaning. Here, instructors are required to create situations in which they apply the information in real-life. That means students should construct their own meaning rather than simply accepting information instructors give them. In order to facilitate construction of meaning, students should be encouraged to work together in group collaboratively and cooperatively in which they get real-life experience of working in group, and benefit from each other (Anderson, 2008). In supporting this, Donaldson and Conrad (2004) claim that collaborative activities in which each student contributes his/her own idea based on his/her way of understanding allow students for interaction and encourage them to share each other ideas, which promote a deeper level of thought.

Since the ideas and principles of the above three educational theories overlap and used as a taxonomy for learning, online instruction can include the three theories. Accordingly, behaviorist theory can be used to teach what of the learning (necessary information or facts), cognitive theory can be used to teach how of the learning (process and principles) and constructivism theory can be used to teach why of the learning-higher-order thinking that promote personal meaning, and situated and contextualized learning (Anderson, 2008).

In short and precise**,** the best online teaching and learning practice relies on the following areas of focus as to (Chickering & Gamson, 1987; Savery, 2005; Mcmcullom, 2010; Tobin et al, 2015).

- Learning goals, ways of achieving those goals and high expectations should be communicated to the students at the beginning online lesson.
- Safe learning environment should be provided and active learning methods that promote interaction and encourage learners to actively participate in learning process should be used.
- Reciprocity and cooperation among students should be developed.
- The students should get answer to their inquiries and gain prompt and constructive feedback on their work.

- They should be allowed for active, critical reflection on their learning and their progress should be monitored well.

2.5. Elements of online instruction

According to Draves (2013), online instruction has three elements namely content, interaction and assessment.

2.5.1. Content

Content as to Draves (2013), is online learning materials that can be delivered to students online through written texts, audio and video presentations or through oral live presentation. The written texts can be lecture notes or instructional presentations that a teacher uploads and makes it available to students at any time they want to access it. In this way, students can view, or review the material at any time, pace, intensity and time commitment they want. The other written texts students should be access to via internet are large amount of printed texts like references, new researches, updated materials, short articles and other information that can be uploaded and available to the learners so that they have the accessibility of adequate and variety of information. What is more, students should be access to links to other web sites that provide students with wealth reading materials, online discussions or chat (Draves, 2013). Links to learning and teaching web sites according to Bach et al (2007) refer to large publishing companies that provide students with textbooks or e-books to encourage students to use the wide and varied resources of the Internet.

As to Draves (2013) content can also be delivered through audio presentation. This can be recorded presentations or lectures from the teacher, along with visual slides that can be downloaded to computer and played anytime. Thus, recorded online audio presentations can replace live lectures in face-to-face classes, allowing both teacher and students to spend more time in discussion and on advanced topics or in-depth study. In general, audio presentation has got the following advantages as to the author. First, students never miss a lecture because they can listen to the recorded materials during their own peak learning time. Second, students who know some parts of the lecture can skip to other parts of the course, which make the students interestingly involve in the teaching–learning process. Finally, learners can repeat any parts of online lecture in order to gain deeper insight.

Another way of delivering content is through live or video presentation whereby learners listen to a lecture at limited period of time or through live or recorded video presentation with duration of

several seconds or minutes with the help of interesting graphic images, concise text, and appropriate narration. Accordingly, instructors can produce their own live or recorded video presentations with slides by the help of multimedia professionals with energetic voice.

In general, online course should be presented with multimedia and more interaction because learners are not satisfied with solely text-bases online course. These days generation wants to learn with multimedia because different learners learn in different ways. Some of them want to learn by listening and other by watching and listening (Draves, 2013).

Some other Contents can be delivered through animations and simulations. As Draves (2013) animations are cartoons which illustrate a point, technique, or concept or they can be short moving picture clips illustrating a technique or activity. Simulations are animations with interactivity, which are commonly used in science courses, such as illustrating a chemical reaction, or how molecules interact, or how an engine works.

2.5.2. Interaction

Concerning interaction, Draves (2013) declares that the heart and the soul of an online course is not the lecture note, delivery the instructor makes, audio or video presentation, but it is the interaction between the learners and the teacher, as well as the interaction among the students themselves. Hiltz (1994) cited in Draves (2013) also suggests that students who take the advantage of interacting with their instructors and other students and who actively participate in the course benefit more in online learning. This is because students' engagement in online learning is developed through interaction (Anderson (2003) and students' engagement is very crucial in stimulating online teaching-learning today (Banna et al., 2015). Strategies to ensure students' interaction in online learning, as to Chickering and Gamson (1987); Anderson (2008), are using different pre-learning activities to establish appropriate climate for students' engagement to happen, providing learners with prompt feedback on their performance, using varieties of teaching method and activities to address individuals' needs and styles, giving students opportunity to reflect on the lesson, allowing students to work cooperatively and collaboratively, providing students with adequate time for activities and increasing contact between students and instructor.

2.5.2.1. Mode of online interaction

There are two mode of interaction in online instruction: synchronous and asynchronous (Draves, 2013; Littlefield, 2018; Piskurich (2004) & Sarkar (2016).

2.5.2.1.1. Synchronous online interaction mode

Synchronous online interaction mode is structured learning strategy in which the courses are scheduled at specific times and in live virtual classroom settings and students make real time interaction with their instructors and other students and get instant messaging and feedback (Littlefield, 2018). This mode of interaction as to Piskurich (2004) and Sarkar (2016), is the direct interaction between learners with instructors and other learners whereby the interaction takes place at the same time the course offer is on progress, and students get quick information and feedback from their instructors.

2.5.2.1.2. Asynchronous online interaction mode

Asynchronous online interaction is a method of interaction whereby learning materials are presented in some recorded or written format and the learners interact with the materials and give their responses at any time of their convenience and then instructor provide feedback via written texts. This means learning environments are not properly structured and students are not provided with learning contents in live classrooms, but they get access to the contents at any time of their convenience on different learning management systems. In this way, instant feedback and immediate response are not possible under such an environment (Piskurich, 2004; Sarkar, 2016; Littlefield, 2018). This means students are provided with online contents or activities and are given time frame work to finish the course work and are allowed to make written comments so that everybody in online class can see. Then, the participants read the comments, ask questions or react to the comments, and have a group discussion through written texts. The advantage is that students are access to learning materials and able interact with the materials and give their suggestions at the time of their convenience (Draves, 2013). Therefore, in this mode of discussion almost all students can take part in the discussion since each student receive questions and provide response at different time of his/her convenience. In addition, it allows more thoughtful comments and responses, which is more supportive of their learning.

2.5.2.2. Types of online interaction

Online interaction is of three folds: learner-to-content interaction, learner-to-learner interaction, and learner-to-instructor interaction (Moore, 1993; Bernard et al, 2009).

2.5.2.2.1. Learner-to-content interaction

Moore (1993) claim that student-content engagement is the process of students' interaction with content, which changes students' understanding and perspectives, and this interaction according to Banna et, al (2015) occurs when students read online lecture notes or other learning materials, listen audio presentations, watch instructional videos, and search for information. Therefore, Abrami et al (2011) and Banna et al (2015) recommend that instructors are expected to find scholarly reading interactive instructional materials and design well-though-out assessments to encourage student-content interaction. One strategy of increasing learner-content engagement is using real world application of project that increases subject mastery and critical thinking skills. That means as to Revere and Kovach (2011), instructors should give students resources accompanied with well-designed authentic activities that provide student with opportunities to examine the task from different perspectives and that encourage them to wisely use relevant information in the process.

2.5.2.2.2. Learner-to-instructor interaction

Learner-instructor interaction is the interaction between learners and instructor in different ways and formats that include asynchronous and synchronous communication in text, audio, and video communication (Anderson, 2008). This interaction, according to Dixson (2010) and Gayton and McEwen (2007), brings about higher student engagement in online courses. This is because instructors' presence in an online learning, as to Gayton and McEwen (2007), increase students' involvement in their courses and the more students engaged in their learning; the more meaningful learning will take place. In the same manner, Dixson (2010) and King (2014) state that cooperation and collaboration between students and instructors in online courses increase online student engagement that results in learning success. Therefore, online instructor should create conducive environment for the interactions to happen using multiple communication channels.

2.5.2.2.3. Learners-to-learners interaction

This is interaction among students themselves through different ways. In supporting this, Draves (2013 claims that students learn well by interacting with their peers, which leads to innovative and

effective collaborative learning techniques. This student collaboration can involve different instructor's role, evaluating individual student learning, which enhances the measurement of learning outcomes in addition to saving the instructor's time. The interaction occurs, according to Shank and Sitze (2004), when the learners do something together and get meaningful feedback in return. Thus, in order to help students interact and feel sense of presence, it is essential to provide them with synchronous and asynchronous activities that enhance their engagement and help them feel sense of community (Martin & Bolliger, 2018). Some ways of creating social space to promote student-to-student interaction as to Undermann (2019) are discussion forum, peer-review activities, collaborative work and video conferencing.

In general, interaction with content, peers, and instructors according to Lear et al (2010) help learners become active and more engaged in their courses and also create sense of community among students in online instruction, which solve the sense of isolation and result in high quality of teaching-learning process and more effective learning outcomes.

2.5.3. Assessment in online learning

According to Draves (2013), assessment is another component of online course in which an instructor measures his/her students to get better picture of how much they are doing in the course. Online assessment has to be carried out through multiple methods because different assessment methods allow students to better demonstrate their knowledge and learning, as one measurement in learning does not fit all students. It can be tests or quizzes for example, which help to measure students' progress on weekly or daily basis. Regarding this, instructor post the test or quiz in online classroom and students log on the course and do the test or quiz and hit a submit key and then get immediate feedback. Based on the feedback, the students review some materials they missed, or move ahead if their scores look pretty good. The instructors can also gain access to learners' scores and provide each students necessary aid in his/her progress. This online assessment can be given in different items such as true-false, multiple choice, matching, fill in the blank and short-answer questions.

The other ways of assessing students are proctored tests or exams in which the assessment is given under the control of administers and written assignments posted online whereby students do the assignments and send back to their instructors. Moreover, students are given paper works in which students do and submit the papers and instructors make comment and return them quickly to the students for further work. Furthermore, students can be assessed through online projects work

whereby student engage in a project individually or group projects. In connection with papers and project works, students are also measured by allowing them make live online presentations that lead to discussions in which participants respond to questions, make comments or debate in their discussion groups (Draves, 2013).

In general, the above scholars' ideas indicate that online education consists of three main parts: content, interaction and assessment. Accordingly, students should get reading materials through various ways to entertain students learning styles in the first place and then should be allowed to interact with reading materials they receive, their instructors and other students through asynchronous and/or synchronous way. Lastly they should be assessed through different ways to check if they have understood what they have learnt.

2.6. Prerequisite knowledge and skills for online learning

Lee and Hirumi (2004) suggest that successful implementation of online instruction needs prerequisite skills and knowledge, and lack of these can make students and teacher to experience problem during the implementation. The first prerequisite knowledge and skills for the success of online learning as to Martinez and Sweger (1996) is computer experience and Sturgill, et al (1999) indicate that students without adequate computer skills experienced frustration of trying to work collaboratively in online learning. Understanding basic knowledge about computer and able use it is therefore very essential for an online learning engagement. In addition, Conrad and Donaldson (2004) claim that an online learner must be comfort with the technology, text-based communication, and a higher level of self-direction than in a traditional classroom; the learner will walk away from the course in frustration if this comfort level is not reached.

Moreover, Hiltz (1994) cited in Draves (2013) suggests that higher result in online learning is for well-motivated and well-prepared students who have adequate access to necessary equipment. Thus, before online instruction starts, instructor should make sure whether students have the necessary equipment and the experience of using online technology. In case students have no such experience, they should receive ICT skills such as word-process, send an email with an attachment and log on to the web, learning management system and the way the system is used to support learning, advanced online search techniques, how to use PDF text files, videos and audios for online learning (Bach et al, 2007).

2.7. Technical support during online learning

The key to ensure quality online education is effective support services. This is of two types: support services for teachers and support services for students. Concerning the first one, efforts should be made to improve teachers' online teaching ability because both the synchronous and asynchronous online teaching tools are unfamiliar with most of the teachers. Hence, in order to promote the rapid improvement of teachers' online teaching abilities, they should be provided with training on how to use the synchronous and asynchronous learning software, how to utilize the learning management system, how to conduct learning activity design and so on. In the same way, they should be given continuous support during online teaching-learning process (Huang et al, 2020).

Students should also be supplied with learning supports on how to attend online learning because they may face some technical problems like unable to use computer for online learning, fail to get internet connection and retrieve information. Thus, they should be given orientation on how to use technology for online learning and provided with continuous support during teaching-learning process so that they can actively participate in online learning, and they get frustrated to take part in the learning otherwise (Huang et al, 2020; Drave (2013).

2.8. The roles of different bodies in online learning

2.8.1. The roles of instructor

As to Conrad and Donaldson (2004); Undermann (2019) and Drave (2013) , establishing conducive learning environment is one of the most important things that instructors do to help learners learn online because according to shank (2007), conducive learning environment helps students feel safe to express themselves, share their ideas, and ask questions; otherwise, learner concerns can escalate into significant problems. In the first place, course instructor has to share students with a set of course rules or expectations that govern students' behavior, dealing with disruptive behavior from students for example, provide orientation, and keep learners on track. Second, he/she should establish appropriate climate for relationship to happen so that they know each other and build collaborative relationship in learning environment. At beginning of online lesson for example, instructor has to provide students with introductory community-building exercises (icebreaker introduction) in which students get to know each other and in the process build trust and learn how to work together.

In order to realize this, instructor has to be a role model for students by sending students with warm welcome message, responding to students' questions promptly and respectfully, sharing his/her personal experience and letting students share their personal experience in the same way in order to promote community in online learning. Third, he/she has to identify students' needs and then incorporate activities that address their various learning styles (Conrad & Donaldson, 2004).

The other most important role of the instructor in online classes is to ensure a high degree of interactivity and participation. This means the instructor should design and conduct learning activities that help learners engaged with the subject matter and with their fellow students (Kearsley, 2000 cited in Conrad & Donaldson, 2004). For the interaction to happen, as to King (2014) instructor's constructive feedback on students' work is important.

Since online discussion takes a little longer time to start discussion than classroom discussion, instructor should also give much more direction at the beginning. At the same time, the instructor needs to be very active in the discussion, contributing and facilitating the development of meaning for the students. As online discussions favor the shy student who may be reluctant to make a verbal contribution in class, motivating the students to participate in online discussion is another concern of the instructor. Accordingly, instructor has to ask the students to write a piece of reflection on what they have contributed in and gained from online discussion because they are strongly motivated by assessment (Bach et al, 2007).

For effective online instruction, Settle-murphy (2013) suggests that instructor has to have smooth relationship with students to boost students' participation in online learning. In order to enhance his/her relationship with students, instructor has to encourage students involvement when relevant, encourage full and fair online discussion when students' viewpoint is contrary to his/her own, appear receptive to students' suggestions, answer students' question in a direct and understandable manner and real conversation that takes time, at least occasionally. Anderson (2008) summarizes that the role of instructor is facilitator, helper, and partner in the learning process. Therefore, he/she does not simply provide information but must create the conditions in which learning can take place. Berge (1995) also adds saying that the role of the instructor when teaching in the online environment is categorized as pedagogical, social, managerial, and technical. In order to motivate students for discussion, Conrad and Donaldson (2004) state that instructor has to arrange students in pair and provide them with activities that require critical thinking, reflection, and sharing of ideas and then

later provide them with activities that require them work collaboratively in small groups whereby all member of a group are responsible for one another's learning in order to solve certain problems. To do these activities, as to Conrad and Donaldson (2004), learners have to be given adequate time to carry out the activities because online communication takes longer time than classroom communication in most cases.

2.8.2. The role of students

Learners' participation in teaching-learning process is often higher in online courses. Learners must do more thinking, writing, doing, sharing, reflecting, collaborating, and peer reviewing as part of a community of learners (Conrad & Donaldson, 2004). According to Anderson (2008) and Conrad and Donaldson (2004), learners are the center of learning because their role in online learning is to actively participate and engage themselves in online learning, that is, interact with reading materials and tasks they receive and respond using text-based chat, work with other students collaboratively and cooperatively through synchronous or asynchronous mode whereby they support one another and are responsible for one another learning. They also interact with their teachers in asking and answering questions, reflecting on their learning and then constructing knowledge and applying that in practical situations. Besides, they are expected to do different activities they are given from their instructors individually or in collaboration with other students through asynchronous and synchronous methods.

2.8.3. The roles of education institutions and government

In order to ensure high-quality content, diverse learning activities and effective learning outcomes, government, educational institutions and enterprises should closely work in collaboration. Government should play roles in policy making, overall coordination and effective supervision. It should coordinate to build smooth communication platforms, to select suitable learning resources, to provide convenient learning tools, to encourage diverse learning methods and to support flexible teaching methods (Huang et al, 2020).

2.9. Challenges of online learning

The first challenge in online learning is insufficient equipment and connectivity. If online participants do not possess computers and fast internet connection, the implementation of online learning is not feasible. The other challenges of online instruction are inadequacy of technology experience which

results from inadequate training on how to use technology for online instruction and technical support during the implementation (Johnson et.al, 2016 & Ertmer et al., 2012). Johnson et al (2016) suggest, in order for the participant capable of using online education technology to their full potential, they should be provided with effective training and technical support from information technology professionals to help them use new technology. In addition, online participants should receive online teaching-learning materials they deserve, and lack of availability of such materials online has a significant impact on the implementation of online learning.

What is more, Ertmer (1999) states that the participants' belief and attitude about both educational technology and pedagogy is also crucial factor for successful implementation of online teaching and learning. If teachers for example expect that new technology is not useful or they think that they have no the required experience for example they are more likely prefer to use the face-to-face mode of delivery. In the same manner, if a teacher feels the only way that true learning can take place is through the traditional means of educating in a classroom, the person is generally not a good fit for the online paradigm.

In order to solve this problem Johnson et.al (2016) say that when teachers are frustrated and discouraged because of they feel that they have lost the ability to teach in the manner that best suit them, they should be allowed to select a technology that they feel most comfortable with since no single educational technology is perfect for every teacher.

Moreover, Charles (1981) asserts that learners must be highly self-motivated in online learning environment and lack of motivation that arises from absence of support and guidance is another challenge for implementation of online learning. Therefore, since learners need guidance and the opportunity to become more involved in an online learning environment, instructors have the responsibility to support and promote a learner's internal motivations through external strategies.

2.10. Controversy about online instructions

Although online learning is getting popularity, many educators and trainers do not support online instruction because they do not believe it solves teaching and learning problems (Aragon, 2001). Others also contend that barriers like changing nature of technology, the complexity of networked systems, lack of stability in online learning environments, and limited understanding of how much students and instructors know to participate effectively in online learning hinder effective implementation of online teaching and learning (Brandt, 1996). Liu and Long (2014); Nikoubakht

and Kiamanesh (2019) argue that face-to-face learning is irreplaceable and is the cornerstone of every learning institution, even if the current discourse and technological revolution demand the use of e-learning. To confirm this idea, Wright (2017) and Rachmah (2020) indicate that students prefer offline than online way of learning because they understand materials better when they interact in-person with peer and instructors. However, Jonson et al (2000) argue that it is not guarantee to exactly determine the benefits and drawbacks of online instruction by comparing it to the traditional face-to-face learning environment. Of course, according to Ballantyne (2003), for any online system to work, students must have sufficient access to the Internet and computing facilities, but if they get the access of internet and necessary facilities, as to Hiltz (1994) cited in Drave (2013), it can be as effective as face-to-face learning in many respects because Gill (2003) states that offline and online learning are instructional methods, each one is better at achieving some instructional objectives than other. Therefore, it is important to strongly work on the accessibility of internet and computing facilities.

On the other hand, Schramm (1977) claims that learning is influenced more by the content and instructional strategy than by the type of technology used to deliver course while other studies by Beynon (2007); Clark (2001); Kozma (2001) cited in Anderson (2008) oppose that using certain type of technology influences learning since it can provide efficient and timely access to learning materials anywhere at any time.

In supporting online instruction, Piskurich (2004 and Aderson (2008) state that educational institutions are moving towards using online delivery method for both on-campus and at a distance because it has several benefits for students, instructors and institution.

Firstly, in online education, a learner can learn at his/her peak learning time of day and at his/her own learning speed as it is not limited by time zone and location in that they can regulate their own learning. Learners can also access to up-to-date, relevant and a lot of learning materials asynchronously and are allowed to real-time interaction synchronously with their teachers or can communicate with other experts in the field they are studying. Besides, they can focus on specific content areas and get the opportunity to repeat practice and review learning materials easily. As a result, students think deep and get insight into their learning (Draves, 2013; Piskurich, 2004; Anderson, 2008).

Besides, online learning provides part-time learners with necessary skills that they need at workplace and saves their travel time and costs and allows them complete online course while in their own workplaces. Then, they are expected to apply the knowledge and skills they have gained in specific context of their own (Draves, 2013 & Anderson, 2008).

What is more, online learning allows students work at a time and a place that is compatible with their learning needs (Thomson, 2010), and learners can participate in discussions at easy, absorbing more information in a much shorter time and engaging in more interaction because in this mode of delivery, every student can ask questions and make comments asynchronously at the same time, which doesn't take long time as it does when delivered in-person (Draves, 2013).

The benefit of online instruction for instructors is that instructors can tutor their students being anywhere at any time of their convenience. Secondly, learning through internet gives teachers unprecedented opportunity to treat students as individual, which helps to determine learners' needs and current level of expertise and then provide appropriate assistance accordingly. Thus, in order to help students become knowledge workers, instructors should treat each student as individual because all students do not learn in one way, at the same speed, or at same proficiency but they learn more over the Internet while working at their own speed, time and manner (Anderson, 2008; Draves, 2013).

Regarding its benefits for educational institutions, Piskurich (2004) claims that online learning helps educational institution to delivery training through electronics means to make business. Additionally, since students are expected to come to institutions that offer the course, institutions can hold roughly double or more classes in the same space, a huge cost savings. Moreover, this mode of delivery provide learning materials that meets the just-in-time learning needs of the institutions better than provided by classroom instruction. Therefore, Draves (2013) proves that online learning is popular and becoming more popular all the time. It has become a permanent feature of formal education, training, and continuing education, promising to be a learning format for generations throughout their lives. The best indication is the rapid growth of online learning delivery system and the number of students pursuing their education through online part-time now outnumbers the number of students studying through offline full-time in developed world. This is because online instruction provides education to people without place and time limitation, more people will be able to learn more, for much less cost, and with a tremendous variety in choice of topics and subjects.

Again, Draves (2013) asserts that past research shows that online learning is equally as effective as learning offline, but recent research indicates online learning can be more effective than the traditional classroom and the combination of offline and online is superior to both totally offline and totally online learning. To elaborate this, Thorne (2003) states that combination of the two is used to tailor learning to the individual's need rather than applying a 'one size fits all' approach. This implies that students have different preferred ways of learning either offline or online, and using the combination of the two methods fits each student need and interest. Besides, Garrison and Vaughan (2008) suggest that blending combines the best of both learning experience that cannot be gained through each separately. For further clarification, the authors state it as follows.

> The basic principle is that face-to-face oral communication and online written communication are optimally integrated in such that the strengths of each are blended into a unique learning experience compatible with the context and intended educational purpose.

This indicates that classroom-based courses will eventually become hybrid since learning situations that cannot be feasible through face-to-face can be enhanced by the resources of web. Information transfer for example can be done more effectively online than classroom-based teaching (Draves, 2013).

2.11. Previous researches conducted at national level

First, Tadesse (2015) conducted study on the survey of use of E-learning in higher education in Ethiopia. The study assessed the current status of the use of e-learning infrastructure and services in Ethiopian higher education. Then, data were collected from fourteen universities higher officials through online questionnaire and from ICT staffs and personnel's of the universities through interview. The finding of the study shows that the use of e-learning in higher institutions is at its infant stage and teachers' and administrative staffs' lack of e-learning policy and awareness about e-learning is the main challenges in most universities. Based on the finding, it was recommended that teaching staffs should be given awareness creation and training on the use of e-learning. In addition, e-learning policy and framework should be prepared at both national and institutional level.

Second, Yared (2018) conducted study on perception and challenges of graduate students on blended learning in Ethiopian Civil Service University. The research was survey study that focuses on students' perception towards the blended learning context, blended learning instruction, e-content

features, e-content usefulness and blended learning challenges. Accordingly, data were collected from Civil Service University students who took course using blended method through questionnaire and from selected students through focus group discussion. Besides, data were collected through observation and document analysis.

Then, the result of the study shows that majority of the students preferred blended learning context that it is flexibility, convenience, easy for revision and agreed on the quality, relevancy and organization of learning materials and activities. They also reflected that blended e-contents helped in making course revision effective, creating understanding of each lecture before attending them, creating understanding on course concepts, gaining computer skills that are useful in actual or chosen profession and to catch up on material before an exam. As to the result, half of the students did not find blended learning to be difficult but slow internet connection and lack of ICT infrastructure, lack of online assistance from instructors and IT technicians were challenges in blended learning. Based on the findings, it was recommended that similar studies should be conducted in other academic institutions to make a nationwide improvement on the implementation of e-learning in general blended learning in particular. Moreover, it was recommended that experimental study should be conducted between students who have taken the course in blended format and students who have taken the course in the traditional class room format to study the direct impact of Blended learning on students' academic performance.

Third, Yenework (2017) conducted study on the assessment of e-learning readiness of Assosa University. For this study, data were collected from administrators, teachers, students, ICT experts and library director through questionnaire and interview. Then, the results of the study shows that teachers regarding to technology access and attitudes towards a successful online teaching, students regarding to attitudes towards a successful online learner, administrators regarding to administrative support, and ICT experts regarding to their responsibility are ready but needs improvements. The required readiness which delays e-learning in the institution are the ICT infrastructure problem, lack of awareness and motivation, lack of ICT skill, lack of training facilities, lack of technological confidence and training for teachers and students. Then, it was recommendations that university management and a responsible body should invest more on e-learning readiness by alleviating the factors; reliable and fast internet connection and ICT's for e-learning should be enhanced; continuous computer trainings and up-skilling should be given to teaching staffs in e-learning capability, and learners should be motivated to pursue online courses.

Fourth, Yonas (2019) conducted research on E-learning systems success model: the case of some selected Ethiopian higher education institutions. The main purpose of this study was to develop an e-learning systems success model and to identify factors that determine e-learning systems success in Ethiopian higher education institutions and placed the factors in a holistic model that help evaluate e-learning systems. Accordingly, data were collected from students and instructors through questionnaire, from selected students, instructors and e-learning experts through focus group discussion and from ICT directors through depth interview. In addition, data were also gathered through observation and document analysis. After the analysis, the results shows that the determining e-learning system success factors are institutional support quality, e-learning systems quality, e-learning content quality, learners' e-learning factor, instructors' e-learning factor, systems usage, user satisfaction and e-learning systems outcome. Then, the identified factors were placed in Structural Equation modeling using Smart Partial Least Squares and the findings show that the model is validity and reliability to measure e-learning systems success across EHEIs. Based on this, theoretical and practical contributions were forwarded to researchers and practitioners of this research domain.

Fifth, Moges (2021) carried out study on digitalization in teaching and education in Ethiopia: digitalization, the future of work and the teaching profession project. The main purpose of this study was to explore the current practices, challenges and prospects related to the use and integration of digital technology in education in Ethiopia, and how digital technology was impacting the teaching–learning process in terms of preparing students for a knowledge-based economy. To achieve this objective, data were collected through document analysis such as policy documents and manuals from the Federal Ministry of Education, the Ministry of Science and Higher Education, the colleges of teacher education, and the Federal Technical and Vocational Education and Training Agency. Besides, selected research papers related to the use of ICT in education, media reports, materials and manuals produced by the government, international agencies and development organizations were reviewed. Data were also collected through interviews from key informants at the Federal Ministry of Education, the Ministry of Science and Higher Education, the colleges of teacher education, the Ethiopian Teachers' Association (ETA) and non-governmental organizations such as GIZ. After analysis, the results of the study show that the use of digital technology in Ethiopian schools is at an early stage, mainly due to limited infrastructure development in information and communication technology (ICT) and a lack of trained human resources. Based on the findings, it was recommended that it is necessary to mobilize resources from partners, and financial support from NGOS and

international donors. Besides, the Ministry of Science and Higher Education and the Federal TVET Agency should acknowledge these challenges and work in collaboration with international and development partners such as GIZ who can support TVET through the Sustainable Training and Education Program.

Sixth, Kassahun (2014) conducted study on perception of Jimma University Mathematics students before and after the e-learning implementation in one of the Mathematics courses. Then, data were collected from second year mathematics students of JU in 2012/13 through pre-treatment assessment and post-treatment assessment using questionnaires and focus group discussion. The findings show that students are interested and excited to learn through e-learning in which ICT could make difference in learning. However, students have e-learning system problem such as internet connection, power interruption, e-learning classrooms and their facilities etc. and inadequate and improper arrangement of reading materials and exercises problems. Most importantly, students have the problem of ICT knowledge and skills. In order to solve these problems, it was recommended that reasonable amount of money has to be allocated to solve the problem of technology equipment; relevant ICT professionals should support training and the learning process, problem of internet connection should be reduced, backup generators need to be used during power interruption and students must be provided with adequate and properly arranged reading materials and exercises.

Seventh, Kumar et al (2018) conducted study on e-learning trends, technologies and case insights of student e-readiness from Ethiopia. The main purpose this study was to identify the trends in e-learning and its fundamentals, explore the various technology elements and online resources of e-learning and to assess the student e-readiness of online - e-learning utilities and its impact on e-learning attitude in the specific case of Adigrat University, Ethiopia. Then, data were gathered from Business and Economics College through customized questionnaire and the result indicated that the most preferred social media is found to be Facebook and Instagram. And the most preferred mobile application is found to be IMO, Viber and Telegram. From the analysis, it was inferred that students have positive attitude towards e-learning based on e-readiness predictor variables designed in the conceptual framework namely, perceived usefulness, perceived ease of use, learning satisfaction and Online E-Learning content usage.

Eighth, Abinew and Worku (2018) conducted research on acceptance and use of e-learning systems: the case of teachers in technology institutes of Ethiopian Universities. The aim of the study was to empirically examine students' e-learning readiness, acceptance, and use in Ethiopian public

universities. Then, data were gathered from teachers of five institutes of technology in Ethiopia through questionnaire. Besides, ICT directors of selected universities were also interviewed. After analysis, the results show that major determinant factors of intention to use and actual usage behaviors is the first step to utilize the systems efficiently and effectively. Accordingly, perceived ease of use and perceived usefulness have demonstrated significant contributions to behavioral intention of teachers to use e-learning. Moreover, top management support and training were the most determinant factors in explaining users' actual usage behavior. Based on the results, it was recommended that the management body of universities' at different levels of administration should improve the awareness of staff on the usage of e-learning systems; encourage teachers to incorporate e-learning usage plan in course guide book; and encourage their staff to build good culture of new technology usage in general. It was also recommended that further study should be carried out in all universities across different disciplines with more sample size.

Ninth, Sangheethaa et al (2016) conducted study on effectiveness of E-learning in Selected Ethiopian Universities. The main purpose of the study was to discuss the current status of e-learning systems in selective universities of Ethiopia and to identify how far e-learning is utilized by the teaching and learning community. Then, data were collected from students through questionnaire. After analysis, the findings show that learners' perception of the extent of e-learning effectiveness is neural and their interaction with each other and with their teachers is very low. Based on this it is concluded that the current e-learning system is not utilized properly by students and teachers. Therefore, cloud technology that use interactive e-learning contents with more graphics and multimedia was recommended to improve the interest of students to learn through e-learning.

All the above researches are mainly focus on the current status and applicability of online education, students' perception and readiness, potential challenges or determinant factors that hinder the implementation of online instruction. However, as to the researchers' knowledge there is no comprehensive and depth study conducted regarding online teaching-learning process in Ethiopian context. Therefore, this study assesses the current practices and future prospects of online instruction in Ethiopian universities, which tries to identify whether online instruction has been effectively implemented. This means that the study identifies if students have received adequate online reading materials, have been engaged in learning through interaction and have taken online assessment because Drave (2013) claim that content, interaction and assessment are the three main elements in

online instruction. Along with these, students should own necessary computing facilities and online technology skills, gain adequate guidance and encouragement to participate in online instruction.

In general, the study investigates the overall online teaching and learning process starting from training instructors and students for online instruction to assessing students whereby data are collected from direct and indirect participants of online instruction.

Chapter three: Research methodology

Research methodology is a science of studying how research is done scientifically whereby various steps are generally adopted by a researcher in studying the research problem along with the logic behind them (Kothari, 2004). According, this chapter deals with all methods, techniques and procedures or steps used in the study mainly in collecting and processing data in order to achieve the research objective. Generally, this chapter discusses research design, appropriate sampling techniques, data collection methods and procedures, and data analysis methods the researchers used in this study.

3.1. Research design

In this study, descriptive survey design was applied since the study blends quantitative and qualitative data to provide relevant and accurate information. In supporting this, Denscombe (2014) states that the combination of quantitative and qualitative methods can provide a more complete picture of the situation under study than would be yielded by a single approach, thereby increase the accuracy of data and reliability through triangulation, reduce bias in the research.

In order to answer the research questions, hence, the researchers used quantitative data collection methods to collect data about the practices of online instruction from students and instructors. This method was used to present students' and instructors' responses about the implementation of online instruction during the pandemic, its challenges and their attitude towards online education in numerical statistic. The researchers also used qualitative data collection methods to collect data through interview from department heads, academic deans, library and ICT directors and an expert from ministry of education and through focus group discussion from selected students and instructors.

The collected data was analyzed using quantitative and qualitative methods. The quantitative data was analyzed and presented numerically while the qualitative data were analyzed and presented thematically. Then, triangulation technique was employed to validate the numerical data by comparing it with qualitative data. Lastly, deductive method was applied to draw conclusion from the result found.

3.2.Sampling technique

Sampling was used in this study because dealing with all members of data sources needs tremendous amount of time and resources. For that reason, the researchers divided the current existing 45 universities in Ethiopia into three clusters namely first generation universities (8), second generation universities (15) and third generation universities (22) using cluster sampling technique based on their year of establishment since it was believed that universities established in the same or nearly in the same time are on similar status. The researchers did this to give chance for each generation universities to be included in the study so that it is possible to make generalization for all universities across the country. Next, researchers decided to take universities near to the researchers' workplace from each generation university using purposive sampling technique since going far by quitting classes for long time for data collection would cause damaging problem on teaching and learning process. In addition, the researchers selected the universities based on the existence of natural science and engineering fields and the practice of online instruction. In this way, **Hawasa University** and **Addis Ababa University** from first generation universities, **ASTU** and **Debre Birhan University** from second generation universities, **Walkite University** and **Ambo University** from third generation universities, totally, six universities were included in the study.

Since dealing with all fields of study in all universities requires a lot of resources and time, the researchers identified engineering and natural science from the selected universities for the study. Accordingly, Mechanical Engineering and Computer Science from engineering fields and Chemistry from Natural Science were selected using simple random sampling technique through lottery method. Next, students of the selected departments of the Universities are stratified into two groups namely undergraduate and graduate. Using stratified sampling technique, the undergraduate students were categorized into batches as first, second, third, and so on for the all Universities. The researchers left out first year students (undergraduate) of 2020 batch because the students were not at university during the pandemic when teaching-learning was through online. Thus, it was believed sufficient information might not be obtained from the students. Regarding the instructors, new employees of 2020 with no teaching experiences at the time of the pandemic were excluded from the study during data collection since it was believed that they might not have adequate information about online instruction.

3.2.1. Sample size determination

When the entire sample size has been calculated and allocated to each university and then again allocated to each department of the university, sometimes insignificant number of samples or no representative samples may be obtained. In this case, it may be difficulty to generalize where a department has no or insignificant representative samples. Therefore, in order to minimize this problem, sample size for undergraduate students, graduate students and instructors has been done separately.

3.2.1.1.Sample size for undergraduate students

The total number of the entire students under study was **5, 281** out of which **4853** were undergraduate students and **428** were graduate students. In order to calculate sample size from the entire population, Yamane (1967) simplified formula n=N/1+N (e^2) was used where n=sample size, N= population size, e= the level of precision.

The entire population of the undergraduate was **1,966** with ±5 precision. Assuming 95% confidence level and the maximum variability, which is equal to 50% (p =0.5), with this the sample size is n=1,966/1+1966$(0.05)^2$=**332**. Then, method of proportional allocation was used under which the sizes of the samples from the different strata are kept proportional to the sample sizes of the strata as to (Kothar, 2004). Lastly, the samples were allocated for all Universities and the samples of universities were further allocated for their departments and batches under the departments using method of proportional allocation.

3.2.1.2.Sample size for graduate students

In order to calculate sample size from the entire population, Yamane (1967) simplified formula n=N/1+N (e^2) was used where n=sample size, N= population size, e= the level of precision. The entire population of the graduate is **203** with ±5 precision. Assuming 95% confidence level and the maximum variability, which is equal to 50% (p =0.5), with this the sample size is n=209/1+209$(0.05)^2$=**134**. Then, method of proportional allocation was used under which the sizes of the samples from the different strata are kept proportional to the sample sizes of the strata as to (Kothar, 2004). Lastly, the samples were allocated for all Universities and then the samples of universities were further allocated of for their departments and batches under the departments using method of proportional allocation.

3.2.1.3.Sample size for instructors

The total number of instructors under study was **277**. In order to calculate sample size from the entire population, Yamane (1967) simplified formula n=N/1+N (e^2) was used where n=sample size, N= population size, e= the level of precision. The entire population under the study is 277 with ±5 precision. Assuming 95% confidence level and the maximum variability, which is equal to 50% (p =0.5), with this the sample size is n=277/1+277$(0.05)^2$=**163**

Then, the sample size of instructors in each university and department has been calculated using method proportional allocation.

3.3. Data collection instruments

For the investigation of the practice of online instruction and future perspective on its implementation, different data collection tools were employed. Concerning this, Richards (2001) states that Using different methods to address different areas of the study and at the same time triangulating approaches to data collection (collecting information from several sources) is believed to be very important for researchers to obtain a more reliable and comprehensive data. Based on the above scholars' idea, the researchers used the following data gathering tools.

3.3.1. Questionnaire

The researchers used questionnaire as the main data gathering instrument. This is because Richards (2001) suggests that questionnaires are one of the most common instruments used with large numbers of subjects and used to elicit information about many different kinds of issues like communication difficulties, preferred learning style, classroom activities, attitudes and beliefs. The questionnaires included close-ended questions that were constructed in likert scales. The questionnaires were used to collect data from students and instructors of all selected departments of six Universities.

3.3.1.1.Questionnaire for students

The questionnaire was administered to 332 selected undergraduate students and 134 selected graduate students of all Universities under the study. Accordingly, the questionnaire was distributed to 332 undergraduate students but 309 of them were filled and returned. From this, 257 of them were used while 52 of them were voided because 31 of them were filled out carelessly and 21 of them were incomplete. Therefore, data were collected from 309 undergraduate students from the total of 332. Regarding graduate students, data were collected from 121 out of 134 students, and this indicates that

13 students didn't return the questionnaire because in the first place, it was very difficult to get the students and some of them were not willing to fill out the questionnaire. In general, 378 out of 466 questionnaires were used for the analysis while 52 of them were voided.

The questionnaire consists of whether students received induction training before online class start, received learning materials through different ways and worked hard on the materials, made discussion with their instructors and their classmates, received necessary support from instructors, took online assessment through different ways, difficulties they face in online learning, their attitudes toward online learning and their preferred ways learning.

3.3.1.2.Questionnaire for instructors

The questionnaire was administered to 163 selected instructors. The questionnaire were whether instructors received induction training before online class start, provided students with learning materials through different ways, made discussion with their students and allowed students to students to discuss with each other, provided necessary support to their students, made online assessment through different ways, difficulties they face in online teaching, their attitudes toward online teaching and their preferred ways of teaching.

Accordingly, questionnaire was distributed to **163** instructors but 159 instructors filled out and returned the questionnaire.

3.3.2. Interview

Richards (2001) suggests that interview allows us to make more in-depth exploration of issues as compared to questionnaire though it is only feasible for small groups. Denscombe (2007) states that semi-structured interview allow a certain degree of flexibility in exploring a wide range of issues that may arise during interview. It helps interviewer reflect to information given and seek clarification when required. It also partly allows the respondent to express his/her idea freely. This indicates semi-structure interview help the interviewer to guide the respondents in the way focused data can be obtained by giving them partial freedom to express their opinion.

Accordingly, semi-structured interview was used to collect data from three department heads, one academic deans, one ICT experts and one library experts from each university under study and one expert from ministry of higher education were selected purposively because it was believed that the

respondents would give necessary information regarding the study. Totally, interview was conducted with 37 respondents. The interview was used to identify if online method can be effective in university, the respondents' motivation towards online learning, the implementation of online instruction, difficulty instructors and students faced in online instruction and possible solutions and general suggestions for effective implementation of online instruction in the future.

3.3.3. Focus group discussion

In order to consolidate data that were obtained through questionnaire and interview, focus group discussion was held with students and instructors. Focus group discussion was used to obtain information that might not be gained from students and instructors through questionnaire because the respondents might answer some questions reluctantly in that information they give might be different from the reality, but during focus group discussion, the researchers take time explaining the questions to the respondents and allowed discussion to respond to questions in which the participants share ideas with each other and reached an agreement. In advocating this, Hennink (2014) state that focus group discussions are able to produce "collective narratives" on the research issues that go beyond individual perspectives to generate a group perspective on the issue discussed, which produces a different type and level of data gained through other tools from individual respondent. Patton (1990) cited in Hennink (2014) added that ''focus group discussions can be a highly efficient qualitative data-collection technique which provide some quality checks on data collection in that participants tend to provide checks and balances on each other that weed out false or extreme views.''

There were two heterogeneous groups namely students and instructors make up homogeneous members within each groups to promote smooth dialogue. Accordingly, total of 7 students out of which 4 undergraduate and 3 graduate students and 3 instructors were selected from each university using convenient sampling technique. The discussion was conducted in two separate groups for each university and totally 12 groups were used for the discussion in all universities under the study. The result of the discussion was written on paper in the order of the questions of focus group discussion and this took about 40-50 minutes for each group. Questions for the group discussion incorporated if online instruction can be effective at university, the implementation of online instruction, difficulties they face in online learning and possible solutions, kind of support they needed during online teaching-learning and their preference type of ways of learning in the future.

3.4. Data Collection Procedures

First, the researchers provided clear explanation on the objective of the study for the selected undergraduate students. Then, they filled out the questionnaire under the supervision of the researchers. Next, graduate students and instructors were given questionnaire to fill it out in two to three days' time. This is because they might be busy and bored to fill out the questionnaire in a short period. Therefore, the researchers believed that giving them enough time would help them take time and fill the questionnaire carefully. Second, interview was conducted with department heads, academic deans of the universities, ICT experts, library experts and an expert from ministry of higher education. Lastly, data were collected from selected students and instructors through focus group discussion. The researchers used questionnaire first as questionnaire was the main data gathering tool while the other two instruments were used for triangulation. This would help for the validation of the data obtained, which boost the credibility of data interpretation.

3.5. Data analysis method

Data obtained from a number of sources have been analyzed using quantitative and qualitative methods independently. The quantitative data were analyzed using descriptive statistics (mean, standard deviation, 95% confidence interval for mean and analysis of variance). Mean gives the average value of all responses given to an item of questionnaire. The 95% confidence interval (CI) for mean has been used to point out the probability that the confidence interval captures the true mean value. Analysis of variance (ANOVA) test were used to test significant difference among responses given by groups of respondents. If there is significant difference, that means, P-value is less than 0.05, the values become bold. Here, both ANOVA test and 95% CI for mean help to compare and contrast the responses of the groups and to show level of each group agreement on the issue.

The qualitative data obtained through interview and focus group discussion have been coded and analyzed separately using thematic analysis. Then, the results of two analyses have been blended together and compared to quantitative to come to conclusions.

3.6.Results of pilot study

In the first place, the items of the questionnaire were developed based on thorough review of theoretical and empirical literatures to make sure the validity of the questionnaire. Following that, the pilot study was conducted with 10 instructors and 21 students of Electrical power and control

engineering, Mechanical Engineering and Chemistry departments of Addis Ababa Science and Technology University to obtain the respondents' feedback. Then, we analyzed the data gathered from the respondents using SPSS 2020 to check reliability of the questionnaire and then summarized in the following table.

Reliability of students' questionnaire

Cronbach's Alpha	N of Items
.719	34

As indicated in the above table, 34 items of questions were used to gather data from both graduate and undergraduate students. Then, the gathered data were analyzed and found that the cronbach's alpha value is equal to 0.719.

Reliability of instructors' questionnaire

Cronbach's Alpha	N of Items
.822	34

In the same way, 34 items of questions were used in questionnaire to gather data from instructors. The result of the analysis shows that the cronbach's Alpha value is 0.822. As per the requirement of the Cronbach's alpha, the value should be 0.7 or greater so that the items are considered internally consistent. Accordingly, the overall cronbach's alpha value for the questionnaire were calculated and found to be more than 0.7 for all 34 items of the questionnaire for both students and instructors. Therefore, all items of the questionnaire are found to be reliable.

3.7.Data validity

Since inconsistence of data may have an impact on the final result, checking the quality of data gathered before processing it is very important. Accordingly, the researchers checked the data before data entry and found that about 31 questionnaires were filled carelessly by undergraduate students whereby the data lack consistency throughout the questions of the questionnaires and 21 of them were incomplete. Based on this, the researchers voided the 52 questionnaires and proved that 257 out of 309 questionnaires were valid. On the other hand, 121 questionnaires out of 134 were filled out by graduate students and 159 questionnaires out of 163 were filled out by instructors were found to be valid. Generally, 537 questionnaires out of 568 were found to be valid.

Chapter Four: Result and discussion

Under this chapter, analysis of data gathered from students-undergraduate and graduate and instructors through questionnaires, from department heads, academic deans, ICT and Library directors through interview and from selected students and instructors through focus group discussion have been presented and discussed.

4.1. Quantitative data analysis

Table 1: Students' background information

Sex				Respondents category						Year							
Male		Female		Undergraduate		graduate				Second		Third		Fourth		Fifth	
				Bachelor degree		Masters degree		PhD									
F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P
322	85.2%	56	14.8 %	257	68 %	95	25.1 %	26	6.9 %	134	35.5 %	112	29.6 %	77	20.4 %	55	14.6%

As indicated in the above table, 85.2 % male and 14.8% female students have participated in the study that means the study incorporated both male and female students. Regarding the students' academic level, both undergraduate and graduate students were included in the study, 68% undergraduate and 32 % graduate in which Master's account for 25.1% and PhD students 6.9 %. In relation to their batches, 35.5% were second year students, 29.6% were third year, 20.4 % were fourth year and 14.6% were fifth year. This indicates that first year batch of 2020 were not included in the study believing that they couldn't give adequate information concerning online instruction since they were not in universities when online instruction was on progress during the pandemic, 2019.

Table 2: Instructors' background information

Sex				Respondents' category						Year of experience						HDP training			
Male		Female		Bachelor degree		Masters degree		PhD and above		2-6 year		7-11year		12 and above		Taken		Not taken	
F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P
150	94.3 %	9	5.7 %	6	3.8 %	108	67.9 %	45	28.3 %	63	39.6 %	51	32.1 %	45	28.3 %	142	89.3 %	17	10.7 %

As it can be understood from the table, both male and female instructors have participated in the study whereby male account for 94.3% and female 5.7%. In terms of their educational level, bachelor holders, Master's and PhD and above were included in the study in which they account 3.8%, 67.9% and 28.3% respectively. However, only those who have two and above teaching experience at

university at the time of data collection in 2021 were included in the study because it is believed that new employees of 2020 couldn't give adequate information concerning online instruction since they were not in the universities when online instruction was on progress during the pandemic, 2019. On the other hand, majority of the instructors had taken HDP training (89.3%) and only 10.7% of them hadn't taken the training. Therefore, it is possible to say that majority of them have no pedagogical problem which influences the implementation of online instruction.

Table 3: Students' and instructors' technology skills before starting to learn through online

Statements	Respondents	N	Mean	Std. Deviation	95% Confidence Interval for Mean	P-value
using computer for online learning	Undergrads	257	2.4591	.71758	2.3710-2.5473	**.000**
	Grads	121	3.3636	.83666	3.2130-3.5142	
	Insts	159	3.4151	.67788	3.3089-3.5213	
	All	537	2.9460	.86972	2.8723-3.0197	
using internet	Undergrads	257	4.5370	.53728	4.4710-4.6030	.032
	Grads	121	4.6364	.51640	4.5434-4.7293	
	Insts	159	4.4654	.56006	4.3777-4.5531	
	All	537	4.5382	.54202	4.4922-4.5841	**.000**
using learning management systems and other online communication tools	Undergrads	257	2.5681	.74230	2.4769-2.6593	
	Grads	121	3.4298	.89281	3.2691-3.5905	
	Insts	159	3.4151	.77379	3.2939-3.5363	
	All	537	3.0130	.89454	2.9372-3.0889	**.000**
making online discussion with others	Undergrads	257	2.4475	.67181	2.3649-2.5300	
	Grads	121	3.3719	.83798	3.2211-3.5227	
	Insts	159	3.3208	.76573	3.2008-3.4407	
	All	537	2.9143	.86393	2.8411-2.9876	

Keys* significant difference at 0.05, P=probability value, CI= Confident interval

Undergrads=undergraduate students, grads=graduate students, Insts=instructors

As it is indicated in the above table, the respondents are average or nearly average in using computer for online learning, using learning management systems and other online communication tools and making online discussion with others because the aggregate mean values are 2.94, 3.01 and 2.91 respectively. However, there is significance difference between the respondents in their online skills

because undergraduate students gave low mean values (2.45, 2.53 and 2.44 respectively), which indicates that undergraduate students are less skillful in using online technology for learning as compared to graduate students and instructors before the start of online instruction. The result of focus group discussion made with the students also supports that majority of undergraduate students had no any online learning experience before the start of online learning while graduate students and instructors had some kind of online experience. On the other hand, all the respondents are good or very good in using internet as the aggregate mean value given to using internet is 4.53 and there is no significance difference between the two groups. Analysis of the qualitative data also supports that some instructors and graduate students had certain online teaching and learning experience before the start of online instruction during the pandemic while undergraduate students had no any online teaching-learning experience.

Table 4: Students' response on the implementation of online education

Statements	Respondents	N	Mean	Std Deviation	95% Confidence Interval for Mean	p-value
I have received clear and adequate orientation on how to attend online learning at the beginning of online class	Undergrads	257	2.4669	.83378	2.3645-2.5693	.000
	Grads	121	2.8760	.66546	2.7563-2.9958	
	All	378	2.5979	.80594	2.5164-2.6794	
I have got conducive learning environment in online learning	Undergrads	257	2.4047	.77539	2.3094-2.4999	.000
	Grads	121	3.0248	.73556	2.8924-3.1572	
	All	378	2.6032	.81510	2.5207-2.6856	
I have frequently received adequate and understandable online learning materials accompanied with different activities	Undergrads	257	2.7743	.94147	2.6587-2.8900	.000
	Grads	121	3.1570	.54785	3.0584-3.2556	
	All	378	2.8386	.87275	2.7504-2.9269	
I have frequently received online learning materials through different ways (written texts, videos and audios	Undergrads	257	2.3930	.66529	2.3113-2.4747	.240
	Grads	121	2.3140	.46607	2.2302-2.3979	
	All	378	2.3677	.60914	2.3061-2.4291	
I have frequently worked hard on online materials I received from my instructors	Undergrads	257	3.1012	.75872	3.0080-3.1944	.000
	Grads	121	4.2479	.55198	4.1486-4.3473	
	All	378	3.4815	.88064	3.3924-3.5705	
I have frequently made online	Undergrads	257	2.2218	.85321	2.1170-2.3266	.000

discussions with my instructors through different ways	Grads	121	2.9256	.80793	2.7802-3.0710	
	All	378	2.4471	.90011	2.3561-2.5381	
I have frequently made online discussions with other students in pair or small group through different ways (live virtually and written texts)	Undergrads	257	2.3074	.85403	2.2025- .4123	.000
	Grads	121	2.7438	.86148	2.5887-2.8989	
	All	378	2.4471	.87924	2.3582-2.5360	
I have received adequate and continuous guidance and encouragement in my online learning	Undergrads	257	2.3346	.74797	2.2427-2.4265	.000
	Grads	121	3.0826	.73696	2.9500-3.2153	
	All	378	2.5741	.82150	2.4910-2.6572	
I have received constructive and continuous feedback on my work in online learning	Undergrads	257	2.3191	.78521	2.2226-2.4155	.000
	Grads	121	2.8678	.72964	2.7364-2.9991	
	All	378	2.4947	.80859	2.4129-2.5765	
I have taken online assessment through different assessment methods (responding to questions, taking tests and quizzes, making presentations, doing assignments, research projects and etc	Undergrads	257	2.2257	.78290	2.1295-2.3219	
	Grads	121	3.0909	.94868	2.9202-3.2617	.000
	All	378	2.5026	.93061	2.4085-2.5968	

Keys* significant difference at 0.05, P=probability value, CI= Confident interval

Undergrads= undergraduate students, grads=graduate students

As it can be seen from the above table, the students moderately agree that they had taken training on how to attend online learning because aggregate mean value given is 2.59, but there is significant difference between responses given by the two groups since undergraduate students attached low mean value (2.46). This implies that graduate students had taken the training before the start of online learning since they moderately agree while undergraduate students hadn't taken training on how to attend online learning as they disagree to the point. Analysis of interview from department heads and academic deans and focus group discussion made with students also show that graduate students had received informal training from their respective departments, their instructors and colleagues on how to attend their online learning though it was not sufficient. Undergraduate students, however, hadn't received any training related to online learning.

Nicholls (2002) states that climate set-up in the classroom will have a significant effect on the nature of the teaching and learning process. It influences the motivation of students, and facilitates a positive

attitude towards their learning and this most likely to be achieved where there is mutual respect and rapport between the instructor and students.

Nevertheless, graduate students moderately agree that they had got favorable condition since the mean value given is 3.02 but undergraduate students disagree to the point as the mean value is 2.40, which indicates that they hadn't got conducive learning environment in their online learning. Interview made with department heads, academic deans and ICT directors and focus group discussion made with students indicates that graduate students had got conducive environment but it was not adequate. Undergraduate students on the other hand hadn't received conducive environment for online instruction during the pandemic.

Pertaining the implementation of online instruction, Drave (2013) sates that for effective implementation of online instruction, students should receive adequate online reading materials through different ways (written text, audio and video presentation) to meet students different learning style and interest, make interaction with materials, their instructors and other students and take online assessment through different assessment methods.

However, regarding the provision online learning materials, the students moderately agree that they provided with learning materials but they disagree that they received the materials through different ways (written texts, audio and video) since the aggregate mean values given are close to three (2.88 and 2.36) and there is significant difference between the two groups regarding receiving the materials as undergraduate students attached low mean value to the point. This shows that graduate students were better in receiving online materials as compared to undergraduate students. Analysis of interview made with department heads and academic deans and focus group discussion made with the students shows that graduate students received online learning materials only through written texts accompanied with some activities and very few of them received through written texts, audios and videos. Undergraduate students on the other hand were provided with learning materials only through written text (short lecture notes and activities) but only those who had computers or smart phones and access to internet received the materials.

In relation to how much they had worked hard on the materials, graduate students agreed and undergrads moderately agreed to the point since mean value given are 4.24 and 3.10 respectively.

On the other hand, Drave (2013) claims the center of an online education is not the lecture or the delivery of online course through the audio or video but it is the interaction between the students and the instructors as well as the interaction among the students themselves.

And for interaction to take place, students have to receive encouragement, guidance and immediate feedback during the online teaching-learning process because they want to know how well they are doing and to have access to coaching when they need it (Thorne, 2003). To support this, Martin and Bolliger (2018) suggest that in order to enhance learners' engagement in online learning, they should be provided with authentic activities and allowed to work together synchronously and asynchronously. This helps them feel connected and create a dynamic sense of community, which encourage students for online learning. In addition, as to Dixson (2010) ; Gyton and MCEWEn (2007) cited in Martin and Bolliger, 2018), there has to be cooperation and collaboration between instructors and students in online course whereby instructors actively take part in online discussion and provide instructive feedback to encourage and guide students in their online learning.

Conversely, online discussion graduate students made with instructors (2.92) and with other students (2.74), guidance and encouragement they had received (3.08), feedback they had obtained on their work (2.86) and online assessment had taken (3.09). Undergraduate students disagree to these points as mean values are: 2.22, 2.42, 2.33, 2.31 and 2.22 respectively. This shows that graduate students had made online discussion with their instructors and other students, received guidance and encouragement, obtained feedback on their work and taken online assessment though not sufficient. There were no online discussion, guidance and encouragement, feedback and online assessment regarding undergraduate students.

ANOVA test for almost all points show that there is significant difference between the two groups since undergraduate students attached low mean values to the points, which indicate that the implementation of online instruction for undergraduate students was very weak.

Besides, analysis made from interview and focus group discussion indicates that graduate students had made online discussion with their instructors and other students during presentation of their papers, received guidance and feedback during the implementation and taken online assessment through assignments, oral questions and paper presentations. However, this is not uniform across all departments and universities. On the contrary, undergraduate students hadn't made any online

discussion, obtained guidance and feedback from their instructors and taken online assessment during the implementation.

Table 5**:** Instructors' response on the implementation of online education

Statements	Respondents	N	Mean	Std Deviation	95% Confidence Interval for Mean	p-value
I have received adequate induction training and guidelines on how to teach through internet	Bachelor	6	2.67	.516	2.12-3.21	.238
	Masters	108	2.88	.745	2.74-3.02	
	PhD and above	45	3.09	.925	2.81-3.37	
	Total	159	2.93	.797	2.81-3.06	
I have often got conducive online teaching environment	Bachelor	6	2.83	.753	2.04-3.62	.345
	Masters	108	2.97	.587	2.86-3.08	
	PhD and above	45	3.11	.647	2.92-3.31	
	Total	159	3.01	.611	2.91-3.10	
I have given my students clear and adequate orientation on how to attend online lesson at the commencement of online class	Bachelor	6	2.17	.408	1.74-2.60	**.000**
	Masters	108	2.26	.661	2.13-2.39	
	PhD and above	45	3.18	.747	2.95-3.40	
	Total	159	2.52	.794	2.39-2.64	
I have frequently provided my students adequate and understandable online learning materials accompanied with different activities	Bachelor	6	2.67	.816	1.81-3.52	**.000**
	Masters	108	2.74	.741	2.60-2.88	
	PhD and above	45	3.53	.919	3.26-3.81	
	Total	159	2.96	.871	2.83-3.10	
I have frequently provided my students online learning materials through different ways (written, videos and audios etc)	Bachelor	6	2.17	.753	1.38-2.96	.032
	Masters	108	2.16	.699	2.02-2.29	
	PhD and above	45	2.49	.727	2.27-2.71	
	Total	159	2.25	.720	2.14-2.36	
I have frequently made online discussion with my students through different ways (live orally and written text).	Bachelor	6	1.83	.408	1.40-2.26	**.000**
	Masters	108	2.10	.696	1.97-2.23	
	PhD and above	45	3.04	.824	2.80-3.29	
	Total	159	2.36	.844	2.23-2.49	
I have frequently allowed my students make online discussion with each other students in pair or small group	Bachelor	6	1.83	.408	1.40-2.26	**.000**
	Masters	108	1.85	.489	1.76-1.95	
	PhD and above	45	2.76	.712	2.54-2.97	
	Total	159	2.02	.631	1.92-2.12	
I have given my students adequate and	Bachelor	6	2.17	.753	1.38-2.96	

continuous guidance and encouragement throughout their online learning	Masters	108	2.54	.754	2.39-2.68	**.000**
	PhD and above	45	3.09	.763	2.86-3.32	
	Total	159	2.68	.798	2.55-2.80	
I have provided my students constructive and continuous feedback on their work in online learning.	Bachelor	6	2.00	.632	1.34-2.66	**.000**
	Masters	108	2.49	.690	2.36-2.62	
	PhD and above	45	3.33	.879	3.07-3.60	
	Total	159	2.79	.865	2.66-2.93	
I have assessed my students through different online assessment methods.	Bachelor	6	1.83	.753	1.04-2.62	**.000**
	Masters	108	2.19	.755	2.05-2.34	
	PhD and above	45	3.04	.852	2.79-3.30	
	Total	159	2.42	.874	2.28-2.56	

Keys* significant difference at 0.05, P=probability value, CI= Confident interval

Undergrads= undergraduate students, grads=graduate students

From the above findings, it can be concluded that PhD holder instructors moderately agree that they had received adequate induction training and guidelines on how to teach online and that they had given their students adequate orientation on how to attend online learning on before the start of online teaching-learning process since mean values given were 3.03 and 3.18 respectively. On the other hand, Masters and Bachelor degree holder instructors moderately agree that they had received adequate induction training and guidelines on how teach through internet but they disagree that they had given their students adequate orientation on how to attend online lesson. ANOVA test also show that there is no significant difference between responses given by the respondents regarding receiving induction training but there is significant difference between responses given in giving orientation to their students because PhD holder instructors attached high mean value to point. Interview made with department heads and ICT directors and focus group discussion made with instructors also show that some instructors had received induction training through formally and other instructors received it informally from their colleagues but the training was not adequate and continuous.

Concerning conducive teaching environment, the respondents moderately agree that they had received conducive teaching environment during the implementation since the aggregate mean value given was 3.01. ANOVA test show that there is no significant difference between the responses given by the respondents. Interview made department heads and ICT directors and focus group discussion made with instructors shows that though department heads and ICT directors made effort to create conducive teaching-learning environment, it was not adequate and continuous.

Regarding online materials provision, the respondents moderately agree in providing adequate online materials but disagree in providing the materials through different ways as aggregate mean values given were 2.96 and 2.25 respectively. ANOVA test show that there is significant difference between the respondents in providing adequate materials since Masters and Bachelor holder instructors attached low mean value to the point but there is no significance difference between the responses given by the groups in providing the materials through different ways. Interview made with department heads and focus group discussion made with instructors indicates that instructors provided their graduate students online materials through written text but the materials were not adequate. Very few of them provided their graduate students with online materials through different ways (written text, audio or video). They also provided their undergraduate students with online materials accompanied with activities through written texts but those who had internet access and computer or smart phones received the materials.

Concerning online discussion, PhD holder instructors attached mean value to online discussion they made with students (3.04) and students with each other (2.76), giving adequate and continuous guidance and encouragement (3.09), providing constructive and continuous feedback (3.33) and online assessment through different methods (3.04). This signifies that the instructors moderately agree to the points. On the other hand, Masters and Bachelor holder instructors disagree to points as mean values given were near to 2. ANOVA test shows that there is significant difference between the respondents for the points since PhD holder instructors attached high mean values. This is because PhD holders are believed they were offering courses to graduate students through online during the pandemic. Interview made with department heads and academic deans and focus group discussion made with instructors show that instructors who offered courses to graduate students made online discussion with their students as well as allowed their students to discuss with each other but the discussion was limited to certain topics and departments of the universities under study. They also provided online activities that help the discussion keeps on going, encouraged their students to help them actively participate in the discussion, provided feedback on the students work and assessed their students through different ways. Instructors who had been offering courses to undergraduate students didn’t do any of these except sending their students a kind of activities in the form of assignment since online instruction was partially in practice for undergraduate students during the pandemic.

Table 6: Challenges that students and instructors faced in the implementation of online instruction

Statements	Respondents	N	Mean	Std. Deviation	95% Confidence Interval for Mean	P-value
problem of internet service	undergraduate students	257	4.3619	.63537	4.2838-4.4399	**.000**
	graduate students	121	4.1488	.67898	4.0265-4.2710	
	instructors	159	4.0440	.66889	3.9393-4.1488	
	Total	537	4.2197	.66925	4.1630-4.2765	
lack of computer or smart phone	undergraduate students	257	3.1245	.96423	3.0061-3.2430	**.000**
	graduate students	121	2.4545	.73030	2.3231-2.5860	
	instructors	159	2.3145	.64767	2.2130-2.4159	
	Total	537	2.7337	.91108	2.6565-2.8109	
Problem of electric power cut	undergraduate students	257	3.2646	.90573	3.1533-3.3759	.013
	graduate students	121	3.4793	.90461	3.3165-3.6422	
	instructors	159	3.5094	.92687	3.3643-3.6546	
	Total	537	3.3855	.91750	3.3077-3.4633	
unable to use online technology	undergraduate students	257	4.0117	.65837	3.9308-4.0925	**.000**
	graduate students	121	3.0579	.88786	2.8980-3.2177	
	instructors	159	3.2579	.83601	3.1269-3.3888	
	Total	537	3.5736	.87816	3.4991-3.6480	
lack of adequate and continuous technical support during online teaching-learning process	undergraduate students	257	3.7704	.73807	3.6798-3.8611	**.000**
	graduate students	121	3.0248	.87999	2.8664-3.1832	
	instructors	159	3.3585	.88076	3.2205-3.4964	
	Total	537	3.4804	.86823	3.4068-3.5540	
absence of online learning materials	undergraduate students	257	3.9416	.71841	3.8534-4.0299	**.000**
	graduate students	121	3.6529	.69175	3.5284-3.7774	
	instructors	159	3.5660	.72503	3.4525-3.6796	
	Total	537	3.7654	.73357	3.7032-3.8275	
lack of conducive online learning environment	undergraduate students	257	4.1946	.66224	4.1132-4.2759	**.004**
	graduate students	121	4.0165	.64528	3.9004-4.1327	

	instructors	159	3.9874	.74619	3.8705-4.1043	
	Total	537	4.0931	.69021	4.0346-4.1516	
lack of motivation to learn through online	undergraduate students	257	2.9805	.98207	2.8599-3.1012	.013
	graduate students	121	2.6694	.85038	2.5164-2.8225	
	instructors	159	2.8805	.98318	2.7265-3.0345	
	Total	537	2.8808	.96038	2.7994-2.9622	

Keys* significant difference at 0.05, P=probability value, CI= Confident interval

Undergrads= undergraduate students, grads=graduate students

As indicated in the above table, the aggregate mean value given to problem of internet service (4.21), lack conducive teaching-learning environment (4.09), absence of online materials (3.76), unable to use online technology (3.57), electric power cut (3.38), lack of technical support (3.36), lack of motivation (2.88) and lack computer or smart phone (2.73). ANOVA test displays that there is significant difference between the groups of respondents concerning almost all of the problems. The difference is because of undergraduate students attached high mean value to each problem, which indicates that implementation of online instruction was more challenging for undergraduate students. From the analysis in general it can be concluded that students and instructors often or sometimes encountered the given problems during the implementation online instruction.

Interview made with department heads, academic deans and ICT directors and focus group discussion made with students and instructors also support that the major challenges during the implementation of online teaching-learning were: interruption internet connection or lack of internet access, lack of well-established rooms (studio) for online teaching-learning, electric power cut, lack of well-prepared materials, lack of pedagogy knowledge and technology skills of online instruction, lack of technical support, lack of interest to use online method and lack computer or smart phone. They also added that lack of online education policy and strategies in education system and special bidding system to purchase digital materials are the other challenges that hindered the implementation of online education during the pandemic.

Table 7: Students' and instructors' attitude towards online instruction

Statements	Respondents	N	Mean	Std. Deviation	95% Confidence Interval for Mean	P-value
The implementation of online learning is not possible in our university	Undergrads	257	2.2918	.90380	2.1808-2.4029	.010
	Grads	121	2.0000	.83666	1.8494-2.1506	
	Insts	159	2.2013	.81737	2.0732-2.3293	
	All	537	2.1993	.86998	2.1255-2.2730	
Online teaching – learning can be effective if teaching-learning environment is conducive for teachers and students	Undergrads	257	4.0895	.80269	3.9909-4.1881	.071
	Grads	121	4.1653	.74551	4.0311-4.2995	
	Insts	159	4.2704	.76046	4.1513-4.3896	
	All	537	4.1601	.78015	4.0940-4.2263	
Trying to learn through internet is waste of time	Undergrads	257	1.8521	.86688	1.7457-1.9586	.513
	Grads	121	1.7521	.75588	1.6160-1.8881	
	Insts	159	1.8428	.75920	1.7238-1.9617	
	All	537	1.8268	.81141	1.7580-1.8956	
Taking courses online being anywhere at the time of my convenience is very interesting	Undergrads	257	3.9844	.82901	3.8826-4.0863	.014
	Grads	121	3.7603	.80648	3.6152-3.9055	
	Insts	159	4.0314	.79890	3.9063-4.1566	
	All	537	3.9479	.82015	3.8783-4.0174	
Taking courses sometimes online and sometimes through face-to-face is encouraging	Undergrads	257	4.2101	.75170	4.1178-4.3025	.071
	Grads	121	4.3554	.69354	4.2305-4.4802	
	Insts	159	4.3459	.62630	4.2478-4.4440	
	All	537	4.2831	.70575	4.2232-4.3429	

Keys* significant difference at 0.05, P=probability value, CI= Confident interval

Undergrads= undergraduate students, grads=graduate students

As it is clearly indicated in the table above, the findings reveal that both students and instructors show their agreement to all positive statements and show their disagreement to all negative statements. This tells us that the respondents have positive attitude towards taking course through online. Interview made with department heads and academic deans confirm that they have positive attitude towards online mode of delivery because they believe that online teaching-learning can be effective in universities if conducive environment is created for instructors and students.

Table 8: Preferred way of teaching and learning method

Statements	Respondents	N	Mean	Std. Deviation	95% Confidence Interval for Mean	P-value
I always like to learn through online being anywhere at my convenience.	Undergrads	257	3.4125	.90199	3.3017-3.5233	.090
	Grads	121	3.1901	.89735	3.0286-3.3516	
	Insts	159	3.3585	.96969	3.2066-3.5104	
	All	537	3.3464	.92395	3.2680-3.4247	
I always like to learn through face-to-face.	Undergrads	257	3.7432	.93761	3.6280-3.8584	.230
	Grads	121	3.5950	.75915	3.4584-3.7317	
	Insts	159	3.7547	.80910	3.6280-3.8815	
	All	537	3.7132	.86369	3.6400-3.7864	
I prefer to learn sometimes through online and sometimes through face-to-face.	Undergrads	257	4.1128	.81903	4.0122-4.2135	.011
	Grads	121	4.3554	.68141	4.2327-4.4780	
	Insts	159	4.2264	.65530	4.1238-4.3291	
	All	537	4.2011	.74848	4.1377-4.2646	

Keys* significant difference at 0.05, P=probability value, CI= Confident interval

Undergrads= undergraduate students, grads=graduate students

As the findings indicate, the highest mean score has been attached to the statement that the students prefer the combination of face-to-face and online methods of teaching and learning. Hence, it can be noted that both students and instructors want to use online method when it is possible and face-to-face when online method difficult to use. ANOVA test also prove that there is no significant difference between the three groups of respondents, which mean the three groups of respondents agree on the points. Analysis of interview and focus group discussion also verify that using the combination the two methods is preferable because using single method is less advantageous than using combination of the two.

In supporting this, Vaughan & Garrison (2008) state that the combination of offline and online methods brings together the best or strengths of the two mode learning experiences that goes beyond the capabilities of each separately. It integrates face-to-face oral communication and online written communication into unique learning experience congruent with the context and intended educational purpose. This brings a range of opportunities that require revisiting how students learn in deep and meaningful ways. Integrating the traditional method with online mode of delivery in university

according to Rockwell and Singleton (2007) also helps students to have the experience of online technology, which later helps them to be effective and efficient in using the different types of technology on jobs in the competitive world of work.

Elaborately, Ballantyne (2003) claim that in blended learning, students may begin a group project in a face-to-face session and then continue it online for a number of weeks, then return to present it on campus, integrating the two modes. In this way, the online mode may become a place where students can comment, critique, or analyze material in a leisurely and thoughtful way, instead of having to contend with other students in face-to-face debates. Indeed, this mode provides a safe environment for students who are shy to take part in discussions with those who are louder, more aggressive, or domineering. In this sense, using the online mode as a means of communication can often provoke more thoughtful and reasoned discussions than might be possible in a classroom.

4.2. Qualitative data analysis

Under this section, analysis of interview made with department heads, academic deans, ICT and Library directors and an expert from Ministry of education, and focus group discussion made with selected instructors and students are presented thematically.

4.2.1. Students' and instructors' online instruction experience before the start of online class during the pandemic

Both instructors and students were inquired if they had online teaching-learning experience before online class during the pandemic and then they replied that some instructors and graduate students had certain online teaching and learning experience while undergraduate students had no any online teaching-learning experience.

4.2.2. Efforts made for effective implementation of online instruction

Concerning this, department heads, academic deans, ICT directors and an expert from Ministry of Education were inquired what effort they made before the start of online education during the pandemic and they responded they provided online platform such as Moodle configure whereby instructors upload materials or data for teaching-learning process. MOE for instance provided NADRE-National Academic Digital Repository of Ethiopia, which supplies researchers, lecturers, students and stakeholders from outside of the academic world access to all research works published by Ethiopian universities and research institutions. MOE also provided platform NADLE-National Academic Digital library of Ethiopia for general education. It is academic digital repository containing textbooks, articles, audio books, lectures, simulations, fiction and all other kinds of learning media and provides these materials for free.

The respondents also said that they created conducive situation for students and instructors so that they can get internet access and offered online technology skills training to some ICT experts, instructors and graduate students on how to use internet for online teaching and learning. Instructors were trained on how to use platform like **Google meeting**, **zoom** and **learning** management system to offer courses and were made to put online reading materials on the platform for the students. Informally, experienced instructors were made to share their experience to their colleagues on how to teach online. However, they indicated that the training was not sufficient. Library directors said that they offered training to library workers and graduate students on how to access online materials, and

they also posted necessary information on how to get the access of digital library service on their page. As to focus group discussion made with selected instructors and students, the respondents said that even though attempt was made to give some kind training before the start of online class, they believe that the training was not adequate since the training was not in-depth and continuous. On other hand as to the respondents undergraduate students didn't receive any training related to online instruction before the start of online education during the pandemic.

4.2.3. Instructors' and students' interest and attitude towards online instruction

In focus group discussion made with instructors and students, the respondents reflected their ideas that they are interested to use online method of teaching-learning but there was limited conducive environment for online instruction, which affected their interest. In the interview made with department heads and academic deans, the respondents were asked if delivering course through online can be effective in their universities, and all of them responded that online instruction can be effective if conducive environment is created for both students and instructors. The above analysis indicates that students and instructors have positive attitude towards this mode of educational delivery.

4.2.4. Implementation of online education during the pandemic

Concerning the implementation of online education, first the respondents were asked about the provision of online reading materials. According to respondents' ideas, the provision of the materials varies from department to department and from university to university. The respondents said that in some universities who have digital library (Addis Ababa and ASTU for example), graduate students and instructors can get access to online books and journals subscribing by remote login. Other universities have made few online reading materials available for instructors and students and only students and instructors who were in the campus could get access to the materials since there was remote login.

Instructors also sent reading materials accompanied with activities through written text to their students-both graduate and undergraduate and few of them from some departments of universities sent the materials through audio and video presentations to their graduate students. Then, they said that graduate students received the reading materials but the materials are not adequate in quantity and variety for all students for extensive reading. Again, the provision of the materials was not continuous and uniform throughout the departments under study. Regarding undergraduate students

as to the respondents, only those who had computer or smart phone had received the reading materials sent to them through written text and the materials themeselves were not adequate and well organized.

Concerning the students' participation in online learning, the respondents said that graduate students received some kind of encouragement to participate in online learning from their instructors and then they worked on reading materials they had received. They also made online discussion with their instructors and other students but the discussion was not adequate and uniform across all departments under the study. As to the respondents, undergraduate students didn't receive any encouragement and didn't make any discussion with instructors and other students but they worked on the materials sent to them in the form of lecture notes and activities. Regarding feedback, the respondents said that some of graduate students received constructive feedback through online on their work but it was not continuous and others received it through face-to-face after the pandemic. Regarding undergraduate students, the respondents said that the students were not provided with any kind of feedback on their work through online and some of them were given feedback through face-to-face after the pandemic.

In case of the assessment, some graduate students were assessed through different ways of online (tests, assignments, final exams, research defense and reviewing paper) and accomplished the semester course while others got advice for their papers through online but assessed through face-to-face mode after the pandemic. Regarding undergraduate students, there was no online discussion and assessment except sending them lecture notes or activities in the form of assignment. Therefore, delivering course online was interrupted and then the semester course was accomplished after the pandemic through face-to-face.

Concerning the provision of technical support during the implementation, they responded that they provided in-person and online support for instructors, for instance, uploading materials, making adjustment during internet connection and system interruption during online discussion. However, the support provided varies from university to university. Universities who have skilled ICT experts provided some kind of online support during the implementation though it was not continuous while in other universities, instructors themselves tried their best by their own effort. Therefore, the support was not adequate and uniform across all universities under the study.

4.2.5. Challenges of online instruction and suggested solutions

4.2.5.1. Challenges of online instruction

In the interview made with department heads, academic deans, library and ICT directors and focus group discussion conducted with instructors and students, the respondents were asked the major challenges they faced in the implementation of online instruction and possible solutions for the challenges. Then, the respondents' responses were summarized as the following.

The first challenge as to the respondents was inadequacy of universities' ICT capacity in terms of both infrastructure and human power as to information from ICT directors. The respondents said that limited internet connection (both wire and wireless), server for students and cables, lack of studios and high performing computers for recording and storing data are the challenges on part of infrastructure and deficiency of ICT experts to record, edit and store audio and video lectures are on the side of human capacity. This varies from university to university as to the respondents. The respondents said AAU and ASTU for example are relatively better in ICT capacity while other universities are on the process of organizing it. The second main challenges were lack of knowledge and skills of online technology both on the side of students and instructors and limited technical support during the implementation.

The third major challenges as to information from library directors were lack or shortage of well-organized online reading materials, expensiveness of purchasing the materials through subscription and absence of specific bidding system to purchase the materials. With regard to the price of digital book, the respondents explained that one data base costs about 300,000 dollars which is very expensive. They added that support from top management is so limited to purchase softcopy reading materials as there is misunderstanding on how to purchase digital books. This is because protocol to purchase digital materials in Ethiopia is same as purchasing other materials whereby the purchasers look for discount price but this doesn't work for digital reading materials since it is impossible to get the same learning materials from different publishers. Reading materials published by certain company may not be published by other companies, which makes it difficult to opt for alternative materials with discount price.

The fourth challenges as to the respondents were lack of well-established rooms for online teaching-learning, electric power cut problem and lack of computers or smart phones especially on the part of undergraduate students. The fifth challenges were absence national wide online education policy. An interviewee expert from MOE explained that there are some directives or policy but the policy has been written only for higher education.

The sixth challenge, according to responses of ICT and library directors and an expert from ministry of education, was unwillingness and less emphasis given to online instruction. The respondents said that instructors were reluctance to use online method of teaching-learning, and there is no legal base policy that enforces them to use online teaching and learning method. In addition as to responses from ICT directors, library workers were unwillingness to receive training due to frustration of the pandemic at beginning of course though they were convinced after sometimes. On the other hand, less focus was given to online instruction on the part of universities' top managements as responses given by ICT and library directors. The respondents said that universities top managements were reluctant to allocate adequate budget so that it possible to provide necessary infrastructure for their ICT centers and libraries. They respondents said that lack of readiness (for instance had no email) and devices (laptop, tablet or smartphone) on the part of some students for online learning were another challenges during the implementation.

4.2.5.2. Suggested solutions for future implementation of online instruction

In interview made with universities' managements and an expert from ministry of education and focus group discussion conducted with students and instructors, the respondents were also asked the solution for the challenges. And then they said that this time is digital era, so using online method of offering course should be a must not an optional because it has a lot of benefit for both instructors and students. It saves time and travel cost for them and students can easily get access to learning materials. Our community who cannot come to university physically should get access to education. The best way for equity and quality of education nowadays is using online method combining it with face-to-face method. Thus, implementing online instruction effectively has to be the major agenda for all concerned bodies. Accordingly, the respondents said that MOE has to play prime role in order to create conducive environment for online instruction. In the first place, there has to be nationwide online education policy, adequate budget to purchase necessary infrastructure and carry out related activities. With this regard, an expert from ministry of education said that MOE are strongly working

to amend the policy in such way that it works for all education sectors and to enforce higher educational institution use online mode of delivery as one of teaching-learning process.

As to information from the expert, the MOE is also giving masters cluster leading center training that last for almost one year and graduate training for course designers and curriculum developers on how to design online courses. Besides, the respondent said that MOE is working on learning management system, that is, students' information system in which students get access to online materials adequately. Moreover, it is said that MOE is establishing studios where teaching materials will be recorded and stored, and two courses are being digitalized, which can be used as a model for universities to digitalize other courses. Lastly, as to the respondent, for the expansion and effective implementation of online education in the future, MOE has already prepared strategic plan that can be accomplished in five years and sustainability plan that helps to sustain its implementation. Regarding the sustainability plan, e-learning structure has formed so that it is possible to handle online teaching-learning process by offering responsibility what and who will carry out different activities in education institution.

Second, online platform and strategies have to be in place for its effective implementation, and selected ICT experts and instructors of universities should get adequate and continuous training. Regarding how to the supervise the implementation of online education, the respondent said that universities across the country have been clustered into five as east, west, north, south and central based their geographical location and each of them has cluster center that supervise the implementation of online education and report to ministry of education. Therefore, as to the respondents, the ministry receives information about the implementation of online education through the cluster centers.

As to the respondents, universities across the country on their part should aggressively work in order to create conducive environment for students and instructors. They said that Universities should strongly work to enhance their ICT capacity by allocating adequate budget for purchasing necessary infrastructure and doing other activities. Secondly, they said universities should give adequate and continuous online technology training to instructors and students before starting to use online method and supervise regularly if the online instruction is going smoothly and allow ICT experts supply necessary technical support accordingly.

Concerning the provision of online reading materials, respondents of the interview and the participants of focus group discussion were asked for solution, and they responded that since both students and instructors are very interested to read materials in softcopy than hardcopy, universities should strongly work to maximize the number online reading materials in their libraries through subscribing in collaboration with other home universities, which helps reduce the cost of the subscription. In addition, they said that universities should work in collaboration with abroad universities to get online learning materials. Regarding purchasing digital reading materials according to the respondents, there has to be bidding system for purchasing digital materials, which is different from purchasing non digital materials. Purchasing machine that change the existing reading materials in hard copy into softcopy is also another possible solution as to the respondents. Moreover, the respondents suggested that universities have to provide their libraries with adequate library infrastructures, for example, server, cable, air conditioner, broadband internet connection and computer with high storage capacity.

Thirdly, the respondents said that universities should provide separate and quiet rooms where instructors able to deliver their course without disturbance. In addition, every university has to have automatic generator of its own in case there may be electric power cut. Universities should work on how instructors get additional incentives since online instruction demands extra time and effort and this helps to boost their interest of implementing online instruction. They become less interested to use this mode of delivery otherwise.

In suggesting how online instruction will be used in the future, the respondents said universities have to use combination of the two methods, blended method whereby online is used when it is possible and face-to-face when it is difficult to use the online mode. This is because using combination of the two methods is by far beneficial than using each separately.

Chapter five: Summary, Conclusions and Recommendations

5.1. Summary

The main objective of this study is investigating the current practices and future prospects of online instruction in some selected universities in Ethiopia with reference to Natural Science and Engineering students. The study is to identify whether online instruction has been effectively implemented and if not, to find out major problems that hinder its effective implementation. In order to achieve this objective data were collected from different sources through 5 likert scale questionnaire, interview and focus group discussion. Then, the data obtained were analyzed qualitatively using descriptive statistics and qualitatively using thematic analysis and then it has been identified whether online instruction has been implemented effectively and major difficulties that hinder its implementation have been prioritized. Accordingly, the major findings of the study are summarized as follows.

5.1.1. The current practices of online instruction

In attempt to identify the current practices of online instruction, instructors and students (graduate and undergraduate) were presented with statements that indicate how online instruction has been implemented effectively. In view of that, students were presented with statements that require them answer if they received adequate online reading materials and worked hard on the materials, made online discussion with their instructors and other students and took online assessment through different ways. Then, the respondents were required to rate to what extent they agree to the statements about the implementation of online instruction. Based on mean values attached to the statements, the respondents moderately agree that there was provision of online reading materials and disagree that the provision was through different ways. Regarding to what extent the students worked hard on the reading materials, there is significant difference between graduate and undergraduate students; graduate students agree and undergraduate students moderately agree to the point. Interview and focus group discussion made with students and instructors show that there was provision of online materials during online instruction but the materials were not adequate for extensive reading and were limited to written texts. Regarding undergraduate students, only those who had computing facilities and internet access received the materials and worked hard on them.

In case of online discussion, graduate students and PhD holder instructors who were offering courses to graduate students moderately agree that there was online discussion between instructors and students and among the students themselves. Finding from qualitative data analysis also prove that

there was online discussion for graduate students but the discussion was not adequate since it was not continuous and uniform in all departments under the study. However, undergraduate students and masters and bachelor holder instructors who were offering course to undergraduate students disagree that there was no online discussion for undergraduate students. In the same way, graduate students and PhD holder instructors moderately agree that there was some kind of guidance, encouragement and feedback for the students in the implementation. Conversely, undergraduate students and masters and bachelor holder instructors disagree that there was guidance, encouragement and feedback for the students during the implementation.

Pertaining online assessment, graduate students and PhD holder instructors moderately agree that online assessment was made through different ways while undergraduate students and masters and bachelor holder instructors disagree to the point. Finding of qualitative data analysis also verify that online assessment was made for graduate students though it was not uniform across universities and departments under study while there was no any online assessment for undergraduate students.

5.1.2. Challenges students and instructors encountered during the implementation

An attempt was also made to find out the difficulties students and instructors faced in the implementation of online instruction. Regarding this, students and instructors were presented with challenges they are expected to encounter during the implementation. Then they were required to rate how often they face the challenges in online teaching and learning process.

As indicated in the findings, the aggregate mean value given by students and instructors shows that they often face problem of internet service and conducive environment during the implementation. Besides, they sometimes face difficulty of absence of organized online materials, unable to use online technology, lack of technical support, electric power cut, lack of motivation and lack computer or smart phone. Focus group discussion made with students and instructors confirms that they often or sometimes encounter the above mentioned problems during the implementation of online instruction. Interview made with ICT and library directors and an expert from Ethiopian Ministry of education added that scarcity of softcopy materials for online instruction, lack of studio, ICT experts and special computer for recording and storing online materials, lack of specific bidding system for purchasing digital reading materials and lack of legal base policy that enforce instructors to use online mode of education delivery are other major challenges.

5.1.3. Students' and instructors' attitude towards online instruction

In order to identify students' and instructors' attitude towards online instruction, both students and instructors were presented with three positive and three negative statements. Then, the respondents attached high mean values to the positive statements and low mean values to the negative statements, which shows that students and instructors are interested to use online method of teaching-learning. Focus group discussion made with students and instructors also proves that they are interested to use this mode of delivery commenting that there has to be conducive environment for them.

5.1.4. Preferred way of teaching-learning process

In attempting to find out preferred method of online instruction, students and instructors were presented with different methods of online instruction namely online mode of delivery, face-to-face mode and combination of online and face-to-face mode. Then, the respondents attached high mean values to the combination of the two methods, hybrid method and attached low mean value to each of the method. Interview made department heads, academic deans, ICT directors, Library directors and focus group discussion made with students and instructors verify that combination the two methods is preferred to solely one of the two methods.

5.2. Conclusions

Based on the result of data analysis and summary made above, the following conclusions were drawn.

- Students didn't receive sufficient reading materials through different way for effective implementation of online education.

- Online discussion was limited to graduate students, and this itself was not adequate and uniform across all departments of universities under the study. The Provision of feedback, guide and encouragement that contribute for participation of students was also restricted to graduate students.
- Online assessment was limited to graduate students and that was not adequate and uniform across all departments and universities under the study.

- In general, the implementation of online education was partly effective for graduate students, but it was not effective for undergraduate students during the pandemic.

- However, students and instructors have positive attitude towards using this mode of delivery and prefer the combination of face-to-face and online method rather than using each separately.

- The main challenges that hinder the implementation of online education during the pandemic were:

    - deficiency of pedagogical knowledge and skills of online technology to provide online materials, make online discussion and assessment both on the part of learners and instructors since they didn't receive adequate and continuous training before they start online education
    - shortage of softcopy materials in library for extensive reading, lack of studio, ICT experts and special computer for recording and storing online materials
    - problem of internet connection, lack of conducive environment or quiet room for online teaching-learning, electrical power cut problem, lack of motivation to use online mode of delivery and absence of laptop computers or smart phones on part of undergraduate students.

- Lack of specific bidding system to purchase digital reading materials since it is impossible to purchase these materials using bidding system used for other materials.
- Lack of legal base policy that enforce instructors to use online mode of education delivery uniformly cross all departments of universities.

5.3. Recommendations

Based on summary of the findings and conclusions given above, the following recommendations were made.

Implementing online education effectively in higher education has to be the major agenda for all concerned bodies. Accordingly, Ministry of education:

- should play prime role in creating conducive environment for online teaching-learning.
  - Firstly, it should include online educational policy and strategies in Ethiopian education system so that online mode of delivery will be used as a method of teaching-learning process in all universities across the country in the future. This will help to enforce higher education institutions to implement online education uniformly across the country.
  - Secondly, it should take initiative in designing online learning contents and establishing studios or smart rooms for recording and storing online materials.
  - Thirdly, it has to give adequate and continuous pedagogy knowledge and skills of online technology training to selected ICT experts and instructors of universities.
  - Fourthly, it needs to work with concerned bodies so that they can prepare specific bidding system for purchasing digital reading materials.
- should supervise universities to check if universities are using this mode of delivery in teaching-learning process and provide necessary support accordingly.

Universities on their part:

- should allocate adequate budget for online education so that they can provide sufficient online infrastructure like wire and wireless internet connection and computing facilities.
- have to establish studios or smart rooms with necessary computing materials like high preforming computer for recording and storing online teaching materials. And should train their ICT experts adequately in this area so that they can record and store the materials for teaching-learning.

- should give depth and continuous online pedagogy and technology skills training to their instructors and students sufficiently.
- should provide their instructors necessary technical support during the implementation regularly until the instructors adapt to the online platform.
- should supply their libraries with adequate online reading resources and infrastructure like air conditioner, cable, server, broadband internet connection and computer with high storage capacity. as much as possible. One way of increasing the amount of online materials in library is using machine that change their existing reading materials in hardcopy to softcopy. Again they can increase their reading materials through subscribing to publishers in collaboration with home universities, which help reduce the cost of the subscription.
- should supply conducive rooms for online teaching-learning process for instructors and students.
- provide automatic generator to alleviate the problem of electric power cut.
- have to use combination the two methods, blended method whereby online mode is used when it is possible and face-to-face when it is problem to use online. This is because combination of the two methods is by far beneficial than using each separately.

Instructors on their part:

- should create smooth relationship with their students at the beginning online class. This create comfortable environment for the students so that they feel free to raise questions and participate in online discussion.
- should assist their students technically on how to use online platform, guide and encourage them in their online learning.
- have to provide online resources in different ways (written texts-lecture notes, audio and video presentations) accompanied with activities so that the students interact with the materials and reflect their ideas.
- arrange program for real time interaction with their teachers and other students for effective engagement in learning, respond to their enquiry and provide immediate feedback on their performance.
- have to assess their students through different ways (quizzes, tests, assignment, presentation and so on) to check how much they have understood their lessons

6. References

Abinew Ali and Worku Kelemework (2018). Acceptance and use of e-learning systems: the case of teachers in technology institutes of Ethiopian Universities: The case of teachers in technology institutes of Ethiopian Universities: *Appl Inform 5(1)*: DOI: https://doi.org/10.1186/s40535-018-0048-7

Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., & Tamim, R. M. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education, 23(2-3), 82–103*. doi:10.1007/s12528-011-9043-x.

Agbenyegah, A.T. and Dlamini, B. I. (2019) Investigating The Challenges Of E-Learning In A Developing Institution Of Higher Learning: A Hypothetical Approach. *The Journal of Applied Business Research:volume 35, number 3.*

Allen, I. and Seaman, J. (2010). *Class differences: Online education in the United States, 2010. Needham, MA:* Sloan Consortium.

Allen, I. and Seaman, J. (2008). *Sizing the Opportunity: The Quality and Extent of Online Education in the United States*. Needham, MA: Sloan Consortium.

Allen, I. E., Seaman, J., Poulin, R., & Straut, T. T. (2016). *Online report card: Tracking online education in the United States. Babson survey research group and the online learning consortium (OLC):* Pearson, and WCET state authorization Network.

Anderson, T. (2008). *The Theory and Practice of online learning (2nd ed.*). Athabasca University: Athabasca University press.

Aragon, S. (2001). Back to Basics: Using Adult Learning Principles to Create E-Learning Success: *Human Resource EducationUniversity of Illinois at Urbana-Champaign, US.*

Bach, Sh., Haynes, Ph. and Smith, J. L. (2007). *Online Learning and Teaching in Higher Education*. New York: Open University Press.

Ballantyne, ch. (2003). *Online Evaluations of Teaching: An Examination of Current Practice and Considerations for the Future:* Wiley Periodicals, Inc.: Murdoch University, Western Australia.

Balaraman, P. Berhe, G. and Kamalakannan, P. (2018). E-Learning Trends, Technologies and Case Insights of Student E-Readiness from Ethiopia: *UGC Approved Journal, 5 (17).*

Banna, J., Lin, M.-F. G., Stewart, M., & Fialkowski, M. K. (2015). Interaction matters: Strategies to promote engaged learning in an online introductory nutrition course. *Journal of Online Learning and Teaching, 11*(2), 249–261.

Beyene, B. (2006*). Problems and Prospects of e-learning in Ethiopia*: A Paper Presented on the Conference e-Learning Africa, Addis Ababa.

Beyene, B. (2010). *A Model for an e-Portfolio-based Reflective Feedback: Case Study of e-learning in Developing Countries*: a PHD Thesis, Universtat Hamburg.

Bernard, R., Abrami, ph. C. Borokhovski, E. Wade, A., Tamim, R.M., Surkos,M.A. & Bethel, E.C. (2009). A Meta-Analysis of Three Types of Interaction Treatments in Distance Education: *SAGe Journals, 79(3).*

Berge, Z.L. (1995). The role of the online instructor/facilitator. *Educational Technology 35(1), 22-30.*

Brandt, D.S. (1996). *Teaching the net: Innovative techniques in Internet training*. Paper presented at the 11th Annual Computers in Business Conference, Washington, DC.

Charles, N. (1981). The history of the concept of motivation: *Journal of the history of behavioral Sciences*, 17(1):https://doi.org/10.1002/1520-6696 (198101)17:1%3C48::AID-JHBS2300170107%3E3.0.CO;2-J

Chichering, W. & Gamson, Z.F. (1987). Seven principles for Good Practice in Undergraduate Education. *Journal Article (080):* USA: American Association for Higher Education.

Conrad, R.M. & Donaldson, J.A. (2004). *Engaging the online learner: Activities and Resources for Creative Instructio*n. USA: Jossey-Bas. .

Dargie Kahsay (2020): *Ministry Mulling over Online Platform for post graduate students:* Ethiopian Press Agency: Retrieved on September 20, 2020 from Press.et/English/?p=21165#

Denscombe, M. (2007). *The Good Research Guide for Small-Scales Social Research Project (3rd Ed.). England*: Open University Press.

Denscombe, M. (2014) *The Good Research Guide (fourth edition).* Maidenhead, UK: Open University Press.

Derouin, R. E., Fritzsche, B. A., & Salas, E. (2005). E-learning in organizations. *Journal of Management, 31(6),* 920–940. doi:10.1177/0149206305279815

Dixson, M. D. (2010). Creating effective student engagement in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning, 10*(2), 1–13.

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems,* 49, 5-22. https://doi.org/10.1177/0047239520934018.

Draves, W. (2013). *Advanced Teaching Online (4th ed). LERN Books, a division of the Learning Resources Network*: River Falls, Wisconsin, U.S.A.

Driscoll, M & Carline, S (2005). *Advanced Web-based Training Strategies: Unlocking Instructionally Sound Online Learning:* Pfeiffer, An Imprint of Wiley, USA.

Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice*. Taylor & Francis. ISBN 9780203166093.

Ertmer, P.A. (1999) Addressing first- and second-order barriers to change: Strategies for technology integration. *ETR&D 47, 47–61*: https://doi.org/10.1007/BF02299597

Garrison, D. R &. Vaughan, N, D (2008). *Blended Learning in Higher Education: Framework, Principles, and Guidelines:* John Wiley & Sons, Inc: USA.

Gayton, J., & McEwen, B. C. (2007). Effective online instructional and assessment strategies. *American Journal of Distance Education, 21*(3), 117–132. doi:10.1080/08923640701341653

Gill, S. (2003). *Myths and reality of e-learning. Educational Technology*, January-February, 20-24.

Hare, H. (2007). *ICT in Education in Ethiopia: Survey of ICT and Education in Africa:* Ethiopia Country Report, World fact book.

Hennink, M. M. (2014): *Focus Group Discussion: Understanding Qualitative Research*: Oxford: Oxford University Press.

Hill, J. R. (1997). *Distance learning environments via world wide web. In B.H. Khan (Ed.). Web-based instruction (pp. 75-80).* Englewood Cliffs, NJ: Educational Technology Publications.

Huang, R.H., Liu, D.J., Tlili, A., Yang, J.F., Wang, H.H., et al. (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.

Innocent, W.A. and Masue, O.S. (2020). Applicability of E-learning in Higher Learning Institutions in Tanzania: *International Journal of Education and Development using Information and Communication Technology*: Vol. 16, Issue 2.

Johnson, A. M., Jacovina, M. E., Russell, D. E., & Soto, C. M. (2016). *Challenges and solutions when using technologies in the classroom. In S. A. Crossley & D. S. McNamara (Eds.) Adaptive educational technologies for literacy instruction (pp. 13-29*). New York: Taylor & Francis. Published with acknowledgment of federal support.

Kassahun Melesse (2014). Perception of University Students Before and After the E-Learning Implementation in One of the Mathematics Courses: The Case of Mathematics Students in Jimma University: *The Ethiopian Journal of Education and Sciences*: Vol.9, Issue 2.

Ketema, T., & Nirmala, M. (2015). The Impact of E-Learning to Enhance Quality of Education: The Case of Adama Science and Technology University. *African Journal of Computing* & ICT, 8(1), 155-162.

Kibuku, R. N., Ochieng, D. O., and Wausi, A. N. (2020). e-Learning Challenges Faced by Universities in Kenya: A Literature Review. *The Electronic Journal of e-Learning, 18(2), pp. 150-161,* available online at www.ejel.org

King, S. B. (2014). Graduate student perceptions of the use of online course tools to support engagement. *International Journal for the Scholarship of Teaching and Learning, 8*(1). doi:10.20429/ijsotl.2014.080105

Kim, K-J. & Bonk, C.J. (2006): *The Future of Online Teaching and Learning in Higher Education: A survey substantiates some ideas about online learning and refutes others, 16(4):* Retrieved on 22 August, 2020 from https://er.educause.edu/-/media/files/article-downloads/eqm0644.pdf

Kombe, CH. L.M. and Mtonga, D.E. (2021) Mtonga Challenges and Interventions of eLearning for Underresourced Students amid Covid-19 Lockdown: A Case of a Zambian Public University: *Journal of Student Affairs in Africa.* Volume 9(1) 2021, 23-39.

Kothar, C.R. (2004): *Research Methodology: Methods and Techniques (2nd edition*): New Delhi: New Age International (P) Ltd., Publishers

Kumar, P., Berhe, G. & Kamalakannan, P. (2018). E-Learning Trends, Technologies and Case Insights of Student E-Readiness from Ethiopia. *UGC Approved Journal VI (17),* ISSN: 2250-1940.

Lamaster, K. & knop, N. (2004). Improving Web-based Instruction: Using action research to enhance distance learning instruction*: Educational Action Research 12(3).*

Lear, J. L., Ansorge, C., & Steckelberg, A. (2010). Interactivity/community process model for the online education environment. *Journal of Online Learning and Teaching, 6(1), 71– 77.*

Lee, J. and Hirumi, A. (2004). *Analysis of essential skills and knowledge for teaching online*. Florida: University of Central Florida.

Liu C, Long F (2014) *The discussion of traditional teaching and multimedia teaching approach in college English teaching. Paper presented at the 2014 International Conference on Management,* Education and Social Science (ICMESS 2014)

Littlefield, J. (2018). *The difference between synchronous and asynchronous distance Learning*: Retrieved from https://www.thoughtco.com/synchronous-distance-learning-asynchronousdistance- learning-1097959

Martin, F. & Bolliger, D.U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning 22(1), 205-222.* doi:10.24059/olj.v22i1.1092.

McCullom, D. (2010). *Best practices for online teaching*. *Best Online Instructional Practices Study*. *Batimore, MD:* University of Maryland University College (UMUC) Institute for Research and Assessment in Higher Education (IRAHE).

Moore, M. J. (1993). Three types of interaction. In K. Harry, M. John, & D. Keegan (Eds.), *Distance education theory (pp. 19–24).* New York: Routledge.

Mustisya, D. N. &Makokha, G. L. (2016): *Challenges affecting adoption of e-learning in public universities in Kenya: A research Article on social science in the digital age*: A sage publishing company, vol. 13(3-4), 140-157

Nicholls, G. (2002). *Developing Teaching and Learning in Higher Education*: Routledge, Falmer: London and New York.

Nikoubakht A, Kiamanesh A (2019) The comparison of the effectiveness of computer-based education and traditional education on the numerical memory in students with mathematics disorder. *J Psychol Sci 18(73):55–65*

Nunnally, S. W. (1998). *Construction methods and management (4th ed).* Prentice Hall, New Jersey

Palvia, Sh., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., and Sindhi, S. (2018): Online education: worldwide Status, challenges, trends and Implications: *Journal of Global Information Technology Management,* 21:4, 233-241: 10.1080/1097198x.2018

Paygar, A. (2014). *Challenges and Opportunity of Online Learning in Developing Countries with Specific Focus on Liberia: Political Science Senior Thesis*. USA: Bemidji State University

Piskurich, G. M. (2004). *Getting the most from online learning: A learner's Guide*. Pfiffer: AWiley imprint: USA.

Rachmah, N. (2020). Effectiveness of online VS offline classes for EFL classroom: A study case in a higher education. *Journal of English Teaching, Applied Linguistics and Literatures, 3(1), 19-26.*

Reimers, F. M., Schleicher, A., Saavedra, J. & Tuominen, S. (2020). *Supporting the Continuation of Teaching and Learning during the COVID-19 Pandemic: Annotated Resources for Online Learning:* The Organization for Economic Co-operation and Development (OECD).

Reimers, F. M., and Schleicher, A. (2020). *A framework to guide an education response to the covid-19 pandemic of 2020: A global survey*: The Organization for Economic Co-operation and Development (OECD).

Revere, L., & Kovach, J. V. (2011). Online technologies for engaged learning: A meaningful synthesis for educators. *The Quarterly Review of Distance Education, 12*(2), 113–124.

Richard, J. C. (2001). *Curriculum Development in Language Teaching*. Cambridge: Cambridge University press.

Rockwell, S. C., & Singleton, L. A. (2007). The effect of the modality of presentation of streaming multimedia on information acquisition. *Media Psychology, 9(1), 179-191*

Sangheethaa, S., Korath, A & Kefyalew, D (2016). Effectiveness of E-learning in Select Ethiopian Universities: *International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS) Volume V, Issue XI.*

Scott, C. L. (2015): *The futures of learning: Why must learning content and methods change in the 21st century? Educational research paper presented for UNESCO*: United Nation educational, Scienti, fic and Cultural organization.

Seble Wondemagegn (2020). Ethiopia: Agency Drafts Directive to Activate Online Learning: *Addis Furtune,* Addis Ababa: retrieved on October 12, 2020 from https://allafrica.com/stories/202006230669.html

Sarkar, S. (2020). *A Brief History of Online Education*: Admas University: Retrieved on March 25, 2022 from A Brief History of Online Education | Adamas University

Savery, J. (2005). Be VOCAL: Characteristics of successful online instructors. *Journal of Interactive Online Learning, 4*(2), 141–152. www.ncolr.org/jiol/issues/pdf/4.2.6.pdf.

Settle-Murphy, N.M. (2013). *Leading Effective Virtual Teams: Overcoming Time and Distance to Achieve Exceptional Result*. Unite states: Taylor and Francis Group, LLC.

Sife, A., Lwog, E.T. & Sanga, C.(2007). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. *The International Journal of Education and Development Using Information and Communication Technology 3(2).*

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.*

Shank, P. (2007). *The Online Learning Idea : 95 Proven Ways to Enhance Technology-Based and Blended Learning*: John Wiley & Sons, Inc.: Pfeiffer

Shank, P. and Sitze, A. (2004). *Making sense of Online Learning: A Guide for Beginners and the Truly Skeptical:* Pfeiffer: United States of America.

Sturgill, A., Martin, W., & Gay, G. (1999). Surviving technology: A study of student use of computer-mediated communication to support technology education. *International Journal of Educational Telecommunications, 5 (3), 239-259.*

Tadesse Anberbir (2015). *Survey of the Use e-Learning in Higher Education in Ethiopia*: *ResearchGate*

Tirussew Teferra, Amare Asgedom, Jeilu Oumer, Tassew W/hanna, AkliluDalelo and Berhannu Assefa (2018). *Ethiopian Education Development Roadmap: An integrated Executive Summary.* Addis Ababa: Ministry of Education Strategy Center

Thomson, L. D. (2010). Beyond the Classroom Walls: Teachers' and Students' Perspectives on How Online Learning Can Meet the Needs of Gifted Students. Journal of Advanced Academics, 21(4), 662-712. https://files.eric.ed.gov/fulltext/EJ906118.pdf.

Thorne, K. (2003). *Blended Learning: How to Integrate Online and Traditional Learning*: Kogan page: Great Britain and the United States.

Tobin Th., Mandernach, B.J. and Taylor, A.H. (2015). *Evaluating Online Teaching: Implementing Best Practices.* John Wiley & Sons, Inc: Jossey-Bass.

Undermann, B. (2019). *Online teaching strategies: Ten principles of effective online teaching*. Magna publications: Madison, Wisconsin.

Wagner,N. Khaled,H.& Milena, H. (2008). Who is responsible for e-learning success in higher education? A stakeholders' analysis. *International forum of educational technology & society (IFETS) , 26-36.*

Webster, J., & Hackley, P. (1997). Teaching effectiveness in technology-mediated distance learning: *The Academy of Management Journal, 40*(6), 1282-1309.

Wright, B. M. (2017). Blended learning, students' perception of face-to-face and online EFL lessons: *Indonesian Journal of Applied Linguistics, 7(1), 64-71*.

Yamane Taro (1967). *Statistics: An Introductory Analysis (2nd Ed.)*: New York: Harper and Row.

Yared Dinku (2018). *Perception and challenges of graduate students on blended learning in Ethiopian Civil Service University: A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Information Science:* Addis Ababa: AAU.

Yenework Belayneh (2017). *Assessment of E-Learning Readiness of Assosa University: A Thesis Submitted for Degree of Master of Science in Information Science (unpublished).* Addis Ababa: Addis Ababa University.

Yonas Hagos (2019). *E-learning Systems Success Model: The Case of Ethiopian Higher Education Institutions. A Thesis submitted for the Degree of Doctor of Philosophy in Information Technology (unpublished).* Addis Ababa: Addis Ababa University.

Zaghdoud, A. (2020). *The Impact of Digital Transformation on Education Approaches: E-Learning-A Case Study of the National Office for Distance Education and Training*: The University of Algiers, Algeria.

Appendices

Appendix A

Adama Science and Technology University

School of Humanities and Social Sciences

Questionnaire for Undergraduate Mechanical Engineering, Computer Science and Chemistry Students

Dear student,

This questionnaire is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder its implementation and to propose possible solutions. Thus, you are kindly requested to respond to all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

I. Instruction: Please put a tick mark (√) in the box of your choice for each item.

1. Background information

A. Sex : Male ☐ Female ☐

B. Year: Second ☐ hird ☐ ourth ☐ ifth ☐

II. Instruction: Circle number of your choice for each item given in the table.

2. Information about your skills of online technology

To what extent do you agree to your online technology skills before starting to learn through internet?

Items	**Very good**	**Good**	**Average**	**Poor**	**Very poor**
Using computer for online learning	5	4	3	2	1
Using internet	5	4	3	2	1
Using learning management systems and other online communication tools like telegram, zoom, Microsoft team, Moodle, Skype, videos, teleconferencing etc. for online learning.	5	4	3	2	1
Making online discussion with others	5	4	3	2	1

3. Information about the implementation of online learning

3.1. To what extent do you agree to the following statements about your online learning?

Items	Strongly agree	agree	Moderately agree	disagree	Strongly disagree
I have received clear and adequate orientation on how to attend online learning at the beginning of online class.	5	4	3	2	1
I have often got conducive learning environment in online learning.	5	4	3	2	1
I have frequently received adequate and understandable online learning materials accompanied with different online activities.	5	4	3	2	1
I have frequently received online learning materials through different ways (written texts, videos and audios etc.)	5	4	3	2	1
I have frequently worked hard on online learning materials I received from my instructors.	5	4	3	2	1
I have frequently made online discussions with my instructors through different ways (live virtually and written texts) in online learning.	5	4	3	2	1
I have frequently made online discussions with other students in pair or small group through different ways (live virtually and written texts) in online learning.	5	4	3	2	1
I have received adequate and continuous guidance and encouragement in my online learning.	5	4	3	2	1
I have received constructive and continuous feedback on my work in online learning.	5	4	3	2	1
I have taken online assessment through different assessment methods (responding to questions, taking tests and quizzes, making presentation, doing assignments, doing research project and etc.).	5	4	3	2	1

3. Information about challenges you face in the implementation of online learning

How often do you face the following challenges in your online learning?

Items	Very often	Often	Sometimes	Rarely	Never
Problem of Internet service	5	4	3	2	1
Lack of computer or smart phone	5	4	3	2	1
Electric power cut	5	4	3	2	1
Unable to use online technology (using computer for online learning, exploring internet, making online discussion, using learning management systems etc.)	5	4	3	2	1
Lack of adequate and continuous technical support during online teaching-learning process	5	4	3	2	1
Absence of well-organized online teaching-learning materials	5	4	3	2	1
Lack of conducive online teaching-learning environment	5	4	3	2	1
Lack motivation to learn through online	5	4	3	2	1

4. Information about your attitude towards online learning

To what extent do you agree to the following statements about online learning?

Items	Strongly agree	agree	Moderately agree	Disagree	Strongly disagree
The implementation of online learning is not possible in our university.	5	4	3	2	1
Online teaching and learning can be effective if teaching-learning environment is conducive for teachers and students.	5	4	3	2	1
Trying to learn through internet is waste of time.	5	4	3	2	1
Taking courses online being anywhere at the time of my convenience is very interesting.	5	4	3	2	1
Taking courses sometimes online and sometimes through face-to-face is encouraging.	5	4	3	2	1

5. Information about your preferred ways of learning

To what extent do you agree to the following statements about your preference ways of learning?

Items	Strongly agree	agree	Moderate	Disagree	Strongly disagree
I always like to learn through online being anywhere at my convenience.	5	4	3	2	1
I always like to learn in class meeting physically with my instructors and my classmates.	5	4	3	2	1
I prefer to learn sometimes through online and sometimes through face-to-face.	5	4	3	2	1

Appendix B

Adama Science and Technology University

School of Humanities and Social Sciences

Questionnaire for Graduate Mechanical Engineering, Computer Science and Chemistry Students

Dear student,

This questionnaire is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder its implementation and to propose possible solutions. Thus, you are kindly requested to respond to all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

I. Instruction: Please put a tick mark (√) in the box of your choice for each item.

1. Background information

1. Sex : Male ☐ Female ☐
2. Level of education: Masters ☐ PhD ☐
3. Year: Second ☐ third ☐ ourth ☐ fth and above ☐

II. Instruction: Circle number of your choice for each item given in the table.

2. Information about your skills of using online technology

To what extent do you agree to your online technology skills before starting to learn through internet?

Items	Very good	Good	Average	Poor	Very poor
Using computer for online learning	5	4	3	2	1
Using internet	5	4	3	2	1
Using learning management systems and other online communication tools like telegram, Zoom, Microsoft Team, Moodle, Skype, videos, teleconferencing etc. for online learning.	5	4	3	2	1
Making online discussion others	5	4	3	2	1

4. Information about implementation of online learning

To what extent do you agree to the following statements about your online learning?

Items	Strongly agree	Agree	Moderately agree	Disagree	Strongly disagree
I have received clear and adequate orientation on how to attend online learning at the beginning of online class.	5	4	3	2	1
I have often got conducive learning environment in online learning.	5	4	3	2	1
I have frequently received adequate and understandable online learning materials accompanied with different activities.	5	4	3	2	1
I have regularly received online learning materials through different ways (written texts, videos and audios etc.).	5	4	3	2	1
I have frequently worked hard on online learning materials I received from my instructors.	5	4	3	2	1
I have frequently made online discussions with my instructors through different ways (live virtually and written texts) in online learning.	5	4	3	2	1
I have frequently made online discussion with other students in pair or in small group through different ways (live virtually and written texts) in online learning.	5	4	3	2	1
I have received adequate and continuous guidance and encouragement in my online learning.	5	4	3	2	1
I have received constructive and continuous feedback on my work in online learning.	5	4	3	2	1
I have taken online assessment through different assessment methods (responding to questions, taking tests and quizzes, making presentation, doing assignments, doing research project and etc.)	5	4	3	2	1

3. Information about challenges you face in the implementation of online learning

How often do you face the following challenges in your online learning?

Items	Very often	Often	Sometimes	Rarely	Never
Problem of Internet service	5	4	3	2	1
Lack of computer or smart phone	5	4	3	2	1
Problem of electric power cut	5	4	3	2	1
Unable to use online technology (using computer for online learning, exploring internet, making online discussion, using learning management systems etc.)	5	4	3	2	1
Lack of adequate and continuous technical support during online teaching-learning process	5	4	3	2	1
Absence of well-organized online teaching-learning materials	5	4	3	2	1
Lack of conducive online teaching-learning environment	5	4	3	2	1
Lack of motivation to learn through online	5	4	3	2	1

4. Information about your attitude towards online teaching and learning

To what extent do you agree to the following statements about online learning?

Items	Strongly agree	agree	Moderately agree	Disagree	Strongly disagree
The implementation of online learning is not possible in our university.	5	4	3	2	1
Online teaching and learning can be effective if teaching-learning environment is conducive for teachers and students.	5	4	3	2	1
Trying to learn through internet is waste of time.	5	4	3	2	1
Taking courses online being anywhere at the time of my convenience is very interesting.	5	4	3	2	1
Taking courses sometimes online and sometimes through face-to-face is encouraging.	5	4	3	2	1

5. Information about your preferred ways of learning

To what extent do you agree to the following statements about your preference ways of learning?

Items	Strongly agree	agree	Moderate	Disagree	Strongly disagree
I always like to learn through online being anywhere at my convenience.	5	4	3	2	1
I always like to learn in class meeting physically with my instructors and my classmate.	5	4	3	2	1
I prefer to learn sometimes through online and sometimes through face-to-face.	5	4	3	2	1

Appendix C

Adama Science and Technology University

School of Humanities and Social Sciences

Questionnaire for Mechanical Engineering, Computer Science and Chemistry instructors

Dear instructor,

This questionnaire is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder its implementation and to propose possible solutions. Thus, you are kindly requested to respond to all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

I. Instruction: Please put a tick mark (√) in the box of your choice for each item.

1. Background information

1. Sex : Male ☐ Female ☐
2. Level of education: Bachelor degree ☐ Masters ☐ PhD ☐
   Assistance professor and above ☐
3. Training on teaching methodology: I have taken ☐ I haven't taken ☐
4. Teaching experience: 2-6 years ☐ 7-11 years ☐ 12 years and above ☐

II. Instruction: Circle number of your choice for each item given in the table.

2. Information about your skills of online technology

To what extent do you agree to your online technology skills before starting to learn through internet?

Items	**Very good**	**Good**	**Average**	**Poor**	**Very poor**
Using computer for online teaching	5	4	3	2	1
Using internet	5	4	3	2	1
Using learning management systems and other online communication tools like telegram, Zoom, Microsoft Team, Moodle, Skype, videos, teleconferencing etc. for online teaching.	5	4	3	2	1
Making online discussion with students	5	4	3	2	1

3. Information about the implementation of online teaching and learning

To what extent do you agree to the following statements about your online teaching?

Items	Strongly agree	Agree	Moderately agree	Disagree	Strongly disagree
I have received adequate induction training and guidelines on how to teach through internet.	5	4	3	2	1
I have often got conducive online teaching environment.	5	4	3	2	1
I have given my students clear and adequate orientation on how to attend online lesson at the commencement of online class.	5	4	3	2	1
I have frequently provided my students adequate and understandable online learning materials accompanied with different activities.	5	4	3	2	1
I have frequently provided my students online learning materials through different ways (written text, videos and audios etc.).	5	4	3	2	1
I have frequently made online discussion with my students through different ways (live orally and written text) in online learning.	5	4	3	2	1
I have frequently allowed my students make online discussions with each other in pair or in small group through different ways (live orally and written texts) in online learning.	5	4	3	2	1
I have given my students adequate and continuous guidance and encouragement throughout their online learning.	5	4	3	2	1
I have provided my students constructive and continuous feedback on their work in online learning.	5	4	3	2	1
I have assessed my students through different online assessment methods (asking questions, giving tests and quizzes, giving online presentation, giving assignments, giving research projects and etc.)	5	4	3	2	1

4. Information about challenges you face during the implementation of online teaching

How often do you face the following challenges in your online teaching?

Items	Very often	Often	Sometimes	Rarely	Never
Problem of Internet service	5	4	3	2	1
Lack of computer or smart phone	5	4	3	2	1
Electric power cut	5	4	3	2	1
Unable to use online technology (using computer for online learning, exploring internet, making online discussion, using learning management systems etc.)	5	4	3	2	1
Lack adequate and continuous technical support during online teaching-learning process	5	4	3	2	1
Absence of well-organized online teaching-learning materials	5	4	3	2	1
Lack of conducive online teaching-learning environment	5	4	3	2	1
Lack of motivation to learn through online	5	4	3	2	1

5. Information about your attitude towards online teaching and learning

To what extent do you agree to the following statements about online teaching and learning?

Items	Strongly agree	agree	Moderately agree	Disagree	Strongly disagree
The implementation of online teaching is not possible in our university.	5	4	3	2	1
Teaching and learning through online can be effective if teaching-learning environment is conducive for teachers and students.	5	4	3	2	1
Trying to teach through internet is waste of time.	5	4	3	2	1
Giving courses online being anywhere at the time of my convenience is very interesting.	5	4	3	2	1
Giving courses sometimes online and sometimes through face-to-face is encouraging.	5	4	3	2	1

6. Information about your preferred ways of learning

To what extent do you agree to the following statements about your preference ways of learning?

Items	Strongly agree	agree	Moderately agree	Disagree	Strongly disagree
I always like to teach through online being anywhere at my convenience.	5	4	3	2	1
I always like to teach in class meeting physically with my students.	5	4	3	2	1
I prefer to teach sometimes through online and sometimes through face-to-face.	5	4	3	2	1

Appendix D

Adama Science and Technology University

School of Humanities and Social Sciences

Interview for Mechanical Engineering, Computer Science and Chemistry Department heads

Dear Department head,

This interview is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder the implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond to all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Do you think that offering course through online can be effective or recommended in your university?

2. Have you begun online mode of delivery in your department? When have you begun it?

3. What effort has your office made for effective implementation of this mode of delivery?

4. How is the implementation of online instruction in terms of providing online reading materials, making discussions, assessing students and etc.?

5. What are the major challenges that hinder the implementation of online teaching and learning? How do you think you can solve these problems?

6. What do you suggest for the effective implementation of online instruction in the future?

Appendix E

Adama Science and Technology University

School of Humanities and Social Sciences

Interview for Vice Academic Deans

Dear Academic Dean,

This interview is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder the implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Do you think that delivering course through online can be effective or recommended in your university?

2. Have you begun offering course through online in this university? When have you begun?

3. What effort has your office made for effective implementation of online instruction?

4. How is the implementation of online instruction in terms of providing online materials, making discussion, assessing students etc.?

5. What are the major challenges that hinder the implementation of online instruction in this university? How can these problems be alleviated?

6. What is your suggestion for effective implementation of online instruction in the future?

Appendix F

Adama Science and Technology University

School of Humanities and Social Sciences

Interview for ICT Experts

Dear ICT Expert,

This interview is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder the implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Is this university's ICT capacity adequate for effective implementation of online instruction? If no, why?

2. What effort has this office made for effective implementation of online instruction in this university?

3. Has your office provided technical support for instructors during the online implementation? What kind of technical support? Is continuous support?

4. What are the major ICT challenges that hinder the implementation of online teaching-learning in this University? How can these problems be solved?

5. What is your suggestion for effective implementation of online instruction in the future?

Appendix G

Adama Science and Technology University

School of Humanities and Social Sciences

Interview for Library Expert

Dear Library Expert,

This interview is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder its implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Are there any online reading materials available for online instruction? If yes, are they sufficient in quantity and variety? If no, why?

2. What effort has this office made to make online materials access to students and instructors in this university?

3. What are the major library challenges that your office faces in providing reading materials for online teaching-learning in this University? How can these problems be solved?

4. What is your suggestion for effective implementation of online instruction in the future in terms of providing online learning materials?

Appendix H

Adama Science and Technology University

School of Humanities and Social Sciences

Interview for an expert from Ministry of Science and Higher Education

Dear expert,

This interview is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going to provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder the implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Does your office have policy framework or directive for online instruction in higher education?

2. How do you follow or supervise its implementation across all universities in the country?

3. How is the implementation of online instruction in universities across the country?

4. What are the major challenges that hinder the implementation of online teaching and learning at Universities? How can these challenges be alleviated?

5. What strategic plan and implementation mechanisms do you have for its expansion and effective implementation in the future?

Appendix I

Adama Science and Technology University

School of Humanities and Social Sciences

Focus group discussion for selected Mechanical Engineering, Computer Science and Chemistry undergraduate and graduate students

Dear Students,

This focus group discussion is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder the implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond all the questions attentively and genuinely for the success of the study. We assure you that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Do you have online learning experience before starting to learn through online during the pandemic?
2. Have you taken training or orientation on how to learn through internet? Is the orientation or training adequate?
3. Are you motivated to learn through online? If not, why?
4. Have you frequently received online learning materials through different ways (written text, audio, videos) during online teaching-learning? Are the materials adequate? Are the materials organized very well (task-based)?
5. How is your participation in online learning in terms of working hard on learning materials you received from your instructors, frequently making online discussion with your instructors and other students through different ways (live orally and written texts)?

6. Have your instructors frequently provided you varieties of online questions to make your online discussions keep going? Have they encouraged you to participate in online learning? How?
7. Have your instructors given you constructive and continuous feedback on your work throughout your online lessons? If yes, how often?
8. How have your instructors evaluated your online learning progress?
9. What are the major challenges you face in online learning? How can these problems be solved?
10. What is your suggestion for the effective implementation of online instruction in the future?

Appendix J

Adama Science and Technology University

School of Humanities and Social Sciences

Focus group discussion for selected Mechanical Engineering, Computer Science and Chemistry instructors

Dear instructors,

This focus group discussion is designed to gather information to investigate current practices and future prospects of online instruction at some selected universities in Ethiopia. The information you are going provide in this study is very important in order to make judgment whether the online instruction has been implemented effectively, and if not, to find out major challenges that hinder the implementation so that possible solutions will be suggested. Thus, you are kindly requested to respond all the questions attentively and genuinely for the success of the study. Make sure that the data gathered from you is used for research purpose only and will be kept confidential.

The researchers!

Thank you in advance!

1. Do you have any online teaching experience before starting teaching through online during the pandemic?

2. Have you taken training on how to teach through internet? What are the contents? Is the training adequate?

3. Are you motivated to teach through online?

4. Have you frequently provided your students with learning materials through different ways (written texts, audios, videos)? Are the materials adequate? Are the materials organized very well (task-based)?

5. How was your students' participation in online learning in term of ask and answer questions, making online discussion with you and other students and carrying out online activities you provided them?

6. Have you frequently provided your students varieties of online questions to make online discussions keep going? Have you encouraged them to participate?

7. Have you given your students constructive and continuous feedback on their work throughout their online lessons?
8. How have you evaluated your students' online learning progress?
9. What are the major challenges you face in online teaching? How can these problems be solved?
10. What is your suggestion for effective implementation of online instruction in the future?

Appendix K

Transcription of qualitative data

Transcription of interview

Transcription of interview made with department heads and academic deans

Question 1: Do you think that offering course through online can be effective or recommended in your university?

Answer: yes, online instruction can be effective on condition that major challenges that hinder its implementation are alleviated. We mean conducive environment should be created for both students and instructors so that it can be implemented effectively.

Question 2: Have you begun online instruction in your department? When have you begun it?

Answer from AAU and ASTU: we started the online instruction before the pandemic but for very few departments. We can say our universities broadly started implemented online instruction during the pandemic.
Answer from other universities: we started online instruction for the first time during the pandemic.

Question 3: What effort have you made for effective implementation of this mode of education delivery?

Answer: we allowed selected instructors take training or made experienced instructors share their experience to others on how to teach online. We also made instructors train their students. In addition, we created conducive environment in which instructors and students get access to internet connection and we also supervised if online instruction was going smoothly and then we facilitated in which technical support can be provided for the participants. Some of us simply let students and instructors gain informal training from each other and use the method to continue teaching and learning method and provided necessary support during the implementation.

Question 4: How is the implementation of online instruction in terms of providing online reading materials, making discussions, assessing students and etc.?

Answer: online reading materials were sent to both graduate and undergraduate students through written texts and few of our instructors also sent their students (graduate) the materials through audio and video presentations. Graduate students received the materials sent to them but regarding undergraduate students, only those who had computer or smart phone and internet access received the

materials. In general, almost all online materials were sent through written text but the materials were not adequate for extensive reading.

Pertaining online discussion, graduate students made online discussion with their instructors and their peers during their paper presentation. This was not uniform across in departments in our universities. In case of the assessment, some of graduate students were assessed through different ways of online (tests, final exams, research defense and reviewing paper) and accomplished the semester course while others got advice for their papers through online but assessed through face-to-face mode after the pandemic. Regarding undergraduate students, there was no online discussion and assessment except sending them lecture notes or activities in the form of assignment. Therefore, delivering course online was interrupted and then the semester course was accomplished after the pandemic through face-to-face.

Question 4: What are the major challenges that hinder the implementation of online teaching and learning? How do you think you can solve these problems?

Answer: The major challenges were lack internet connection, lack of well-established rooms for online teaching-learning, lack technology skills and technical support on how to use online technology, lack of well-prepared materials, electric power cut, lack of interest on the part of instructors due to different factors and lack computer or smart phone.

Question 5: What do you suggest for the effective implementation of online instruction in the future?

Answer: for its effective implementation, the respondents suggested that ministry of education has to be prime initiative in creating conducive environment, including online instruction in educational policy, designing online learning contents and making all universities use this mode as one of the teaching methods. Besides, it should deal with concerned bodies in which internet is accessible to participants everywhere across the country. Universities on the other hand should strongly work on enhancing their ICT capacity by allocating adequate budget for purchasing necessary infrastructure and doing other activities like training, establishing adequate studio for online teaching-learning process and so on. Moreover, they should give adequate and continuous technology skills training to their instructors and students before the start online instruction, make instructors use this mode of delivery to offer courses and allow ICT experts provide necessary technical support during the implementation. What is more, since using totally online can be difficult, universities should let instructors and students use combination of the online and face-to-face methods.

Transcription of interview made with ICT directors

Question 1: Is this university's ICT capacity adequate for effective implementation of online instruction? If no, why?

Answer : To begin with, the respondents were requested if their ICT capacity is adequate for online teaching and learning and they all responded that ICT capacity is not adequate for effective implementation of online instruction as there are problems like internet connection, data storage, computing facilities, technology skills, server for student, smart rooms (studio for recording) and etc. though this varies from university to university. AAU and ASTU for example are relatively better in ICT infrastructure while other universities are on the process of organizing it.

Question 2: What effort has this office made for effective implementation of online instruction in this university?

Answer: we first prepared platform for both students and instructors. Then, we prepared training manual and offered the training to ICT experts and selected instructors on how to offer course online and made the instructors prepare materials and put them on the platform so that students can access the materials easily but the training was not adequate. We helped instructors use Google meeting, zoom and learning management system to offer courses though the effort we made for effective implementation was insufficient.

Question 3: Has your office provided technical support for instructors during the online implementation? What kind of technical support? Is continuous support?

Answer of ICT experts from AAU, ASTU and Debrebirhan University: We provided technical support in-person and online support for instructors, for instance, uploading materials, making adjustment during internet connection and system interruption during online discussion. However, the support provided varies from university to university.

ICT from other universities: we provided some online support and some cases instructors themselves tried their best by their own effort.

Question 4: What are the major ICT challenges that hinder the implementation of online teaching-learning in this University? How can these problems be solved?

Answer: The major challenges were electric power cut which resulted in internet connection interruption, lack of knowledge and skills online technology especially instructors and students, lack of internet access for students who wanted to take course from their homes and instructors' complaint

for paying for internet they used to offer course from their homes, lack of adequate studio, lack of smart rooms and high performance computer for recording audio and video lectures and storing data, lack experience of recording and editing the materials on the part of ICT experts, lack of legal base policy to enforce instructors use online method and limited focus from administrative and lack of interest to use online platform especially on the part of instructors.

Question 5: What is your suggestion for effective implementation of online instruction in the future?

Answer: This time is digital era, so using online method of offering course should be a must not an optional because it has a lot of benefit for both instructors and students, for example, it saves time and travel cost for them, students can easily get access to learning materials and etc. our community who cannot come to university physically should get access to education. Thus, implementing online instruction effectively has to be the major agenda for all concerned bodies.

In the first place, there has to be nationwide policy, adequate budget allocation to purchase necessary infrastructure and carry out related activities. Second, online platform and strategy have to be in place for its effective implementation. Third, ICT experts, instructors and students should get adequate and depth training. Students and instructors should get necessary support during the implementation. Universities across the country on their part should aggressively work on creating conducive environment for students and instructors so that online instruction can partially been used for equity and quality of education because the best way for equity and quality of education nowadays is using blended learning, partially online mode.

Transcription of interview made with library directors

Question 1: Are there any online reading materials available for online instruction? If yes, are they sufficient in quantity and variety? If no, why?

Answer from Addis Ababa and ASTU librarians: Regarding the availability of reading materials, we have digital library where graduate students and instructors can get the access to online books and journals subscribing by remote login. ASTU library director, we have about 40 thousand e-books and 1595 thesis and dissertations available online but the materials are not adequate.

AAU library director, we have about 200 thousand online books. Still, the books are not adequate in quantity and variety for all students.

Answer from library directors of other universities: we have made few online reading materials available for instructors and students. We are working on how to provide sufficient materials to instructors and students in the future. The problem here is that the materials are available only for students and instructors who avail themselves in the campus.

Question 2: What effort has this office made to make online materials access to students and instructors in this university?

Answer: In order to make online reading materials access to instructors and students, we tried to collect course outlines and reading materials from course instructors and put them online so that graduates students can get online during the pandemic. Then, we had given librarian workers and graduate students training on how to access these online materials. Besides, we had posted necessary information on how to get the access of digital library service on their page and allowed instructors and graduate students access to materials outside of the university through remote login. This was impossible for undergraduate students. Some of us put reading materials on online platform but the materials could only be accessed in the universities compound.

Question 3: What are the major library challenges that your office faces in providing reading materials for online teaching-learning in this University? How can these problems be solved?

Answer: the first major challenges we came across was some library workers willingness to receive training due to frustration of the pandemic at beginning of course though they were convinced after sometimes. The other big problem was purchasing online materials through subscription. One way of providing online reading materials, is subscribing to publishing companies, which demands a huge budget that universities cannot afford on their own. For one data base it costs about 300,000 dollars which is very expensive. The other big problem is limited support from top management in case of purchasing softcopy reading materials since there is misunderstanding on the part the management on book purchase. The protocol to purchase digital materials is same as purchasing other materials whereby the purchasers look for discount price, but this doesn't work for digital reading materials. This is because it is impossible to get the same learning materials from different publishers as reading materials published by certain company may not be published by other companies. This makes it difficult to opt for alternative materials with discount price.

Question 4: What is your suggestion for effective implementation of online instruction in the future in terms of providing online learning materials?

Answer: Since both students and instructors are very interested to read materials in softcopy than hardcopy, universities should strongly work to maximize the number online reading materials in their libraries through subscribing in collaboration with other home universities, which helps reduce the cost of the subscription.

In addition, universities should work in collaboration with abroad universities to get online learning materials. Again, purchasing machine that change reading materials in hard copy into softcopy is also another possible solution. Moreover, universities have to provide their libraries with adequate library infrastructures, for example, server, cable, air conditioner, broadband internet connection and computer with high storage capacity. Regarding purchasing digital reading material, there has to be bidding system for purchasing digital materials, which is different from bidding system for purchasing other materials.

Transcription of interview made with Ethiopian Ministry of Education

Question 1: Does your office have policy framework or directive for online instruction in higher education?

Answer: yes, there is some policy or directives but they are limited to higher education institution. This time, experts are strongly working to amend the policy in such way that it works for all education sectors and to enforce higher educational institution use online mode of delivery as one of teaching-learning process.

Question 2: How do you follow or supervise its implementation across all universities in the country?

Answer: Universities across the country have been clustered into five as east, west, north, south and central based their geographical location and each of them has cluster center that supervise the implementation of online education and report to ministry of education. Therefore, MOE was receiving information about the implementation of online education through the cluster centers.

Question 3: How is the implementation of online instruction in universities across the country?

Answer: first of all, MOE provided online platform such as Moodle configure whereby instructors upload materials or data for teaching-learning process, NADRE-National Academic Digital Repository of Ethiopia, which supplies researchers, lecturers, students and stakeholders from outside of the academic world access to all research works published by Ethiopian universities and research institutions. MOE also provided platform NADLE-National Academic Digital library of Ethiopia for

general education. This is academic digital repository containing textbooks, articles, audio books, lectures, simulations, fiction and all other kinds of learning media and provides these materials for free. Then, online teaching and learning process was completed for graduate students during the pandemic but it was interrupted for undergraduate students. In general, the implementation of online instruction for graduate students was somehow good while it was unsuccessful for undergraduate students.

Question 4: What are the major challenges that hinder the implementation of online teaching and learning at Universities? How can these challenges be alleviated?

Answer: The major challenges were lack of technological knowledge and skills (failure to use the platform for example), lack of readiness on the part of some students (had no email), problem of devices for online learning (laptop, tablet or smartphone), electric power cut, internet connection interruption, reluctance from instructors and absence of policy to enforce the implementation.

In order to solve these challenges, the ministry of education is giving masters cluster leading center training that last for almost one year and graduate training for course designers and curriculum developers on how to design online courses. In addition, the ministry of education is working on students' information system in which students get access to online materials adequately. Besides, experts are strongly working on policy amendment whereby online mode of delivery is used as one of teaching-learning process in all educational sectors. Moreover, in universities, ministry of education is establishing studios where teaching materials will be recorded and stored, and two courses are being digitalized, which can be used as a model for universities to digitalize other courses.

Question 5: What strategic plan and implementation mechanisms do you have for its expansion and effective implementation in the future?

Lastly, as to the respondent, for the expansion and effective implementation of online education in the future, ministry of education has already prepared strategic plan that can be accomplished in five years and sustainability plan that helps to sustain its implementation. Regarding the sustainability plan, e-learning structure has formed so that it is possible to handle online teaching-learning process by offering responsibility what and who will carry out different activities in education institution.

Transcription of focus group discussion made with instructors

Focus group discussions were made with instructors and students at six universities under study and the result has been summarized as follows.

Question 1: Do you have any online teaching experience before starting teaching through online during the pandemic?

Answer: yes, we had certain online teaching and learning experience before the start of online instruction during the pandemic

Question 2: Have you taken training on how to teach through internet? What are the contents? Is the training adequate?

Answer: yes, we received some kind of online teaching-learning training but the training was not adequate since the training was not in-depth and continuous.

Question 3: Are you motivated to teach through online?

Answer: yes, we are interested to use online method of teaching-learning but there has to be conducive environment us. Internet access and other infrastructure should be in place for effective implementation of online instruction; we should be paid incentives since online teaching-learning demands additional time and effort, we become less interested to use this mode of delivery otherwise.

Question 4: Have you frequently provided your students with learning materials through different ways (written texts, audios, videos)? Are the materials adequate? Are the materials organized very well (task-based)?

Answer: we sent our students reading materials accompanied with activities through written text and few of us from some departments also sent the materials through audio and video presentations to our graduate students. However, the materials were not adequate to read extensively and the provision of the materials was not continuous and uniform throughout the departments. Regarding undergrad students, only those who had computer or smart phone received the materials and the materials we sent to undergrad students were also not adequate and well organized.

Question 5: How was your students' participation in online learning in term of ask and answer questions, making online discussion with you and other students and carrying out online activities you provided them?

Answer: regarding participation in online learning, our graduate students ask and answer questions and worked hard on online activities they had received. They also made online discussion with us

and other students but the discussion was not adequate since it was not continuous and uniform across all departments. The discussion was based on conducive environment (internet access and suitable rooms) for both students and we instructors. Undergrad students worked hard on the materials they received in the form of lecture notes and activities but there was no any discussion made with us and other students

Question 6: Have you given your students constructive and continuous feedback on their work throughout their online lessons?

Answer: some of graduate students received constructive feedback through online on their work but it was not continuous and others received it through face-to-face after the pandemic. Regarding undergraduate students, we didn't not provided with any kind of feedback on their work through online and we provided feedback to some students' work through face-to-face after the pandemic.

Question 7: Have you frequently provided your students varieties of online questions to make online discussions keep going? Have you encouraged them to participate?

Yes, we have provided our students different activities to help them make online discussion and provided them with some kind of encouragement to participate in online learning. We didn't encourage our undergraduate students because we cannot say that there was online teaching-learning for the students.

Question 8: How have you evaluated your students' online learning progress?

Answer: we assessed our graduate students through tests, assignments and presentation of papers through online and final exam through face-to-face but it was not uniform across all departments. Some of us assessed our graduate students through online and others. Regarding our undergraduate students, there was no online assessment except sending them some online activities whereby some of them received activities while others didn't receive due to lack computer and/or internet access.

Question 9: What are the major challenges you face in online teaching? How often have faced them

Answer: The major challenges we encountered in the implementation were problem of internet connection, electric power cut, limited technology skills, limited technical support, shortage of rooms for online teaching-learning, lack of motivation due to limited conducive environment, lack computers or smart phone and lack of online infrastructure in general. We often or sometimes encounter the above mentioned challenges during the implementation of online instruction.

Question 10: What is your suggestion for effective implementation of online instruction in the future?

Answer: MOE and universities should closely work together to make online mode delivery uniform across all universities and departments Universities by creating conducive environment for instructors and students. Universities on should also provide sufficient online infrastructure like wire and wireless connection and computing facilities. Besides, we should be provided separate and quiet rooms where we able to deliver course without disturbance. In addition, we should be given adequate and continuous online technology skills training before starting to use online method and get supervised regularly and supplied with necessary support accordingly. Moreover, we think that every university has to have automatic generator of its own in case there may be electric power cut. Lastly, we should be given additional incentives since online instruction demands extra time and effort and this will motivate us to implement online instruction effectively. Furthermore we suggest that universities have to use blended method whereby online is used when it is possible and face-to-face when it is difficult to use the online mode.

Transcription of focus group discussion made with students

Question 1: Do you have any online learning experience before starting teaching through online during the pandemic?

Grad students' answer: Yes, we had certain online teaching and learning experience before the start of online instruction during the pandemic

Undergrad students' answer: we had no any online teaching-learning experience.

Question 2: Have you taken training on how to learn through internet? What are the contents? Is the training adequate?

Grad students' answer: yes, we received some kind of online teaching-learning training but the training was not adequate since the training was not in-depth and continuous. On other hand, undergrad students' answer: no, we didn't receive any training before the start of online instruction.

Question 3: Are you motivated to learn through online?

Answer: yes, we are very interested to use online method of teaching-learning but there has to be conducive environment them. Internet access and other infrastructure should be in place for effective implementation of online instruction.

Question 4: Have you frequently received learning materials through different ways (written texts, audios, videos)? Are the materials adequate? Are the materials organized very well (task-based)?

Grad students' answer: our instructors sent us reading materials accompanied with activities through written text and few of them from some departments also sent to some of us the materials through audio and video presentations. However, the materials were not adequate and well-organized. The provision of the materials was also not continuous and uniform throughout the departments. Undergrad students' answer: our instructors sent us online materials only through written text and the materials themselves were not adequate and well organized. Yet, only those who had computer or smart phone and internet access received the materials.

Question 5: How was your participation in online learning in term of ask and answer questions, making online discussion with instructors and other students and carrying out online activities your instructors provided you?

Grad students' answer: our participation was somehow good. We asked and answered questions. We worked on reading materials we had received. We also made online discussion with their instructors and other students but the discussion was occasional. Some of us made it every weekend and other of us made it only during paper presentation. Few of us didn't make any online discussion and paper presentation was made face-to-face after the pandemic.

Undergrad students' answer: our participation was poor we can say. We worked on the materials sent to us in the form of lecture notes and activities but there was no any discussion made with our instructors and other students.

Question 6: Have your instructors given you constructive and continuous feedback on their work throughout their online lessons?

Graduate students' answer: yes, some of us received constructive feedback through online on their work but it was sometimes and others received it through face-to-face after the pandemic.

Undergrad students' answer: we undergraduate students didn't receive feedback on our work online but some of us were given feedback through face-to-face after the pandemic.

Question 7: Have your instructors frequently provided you with varieties of online questions to make online discussions keep going? Have your instructors encouraged you to participate?

Grad students' Answer: Yes, there are some questions that our instructors sent us to do during the implementation. We graduate students received some kind of encouragement to participate in online learning from their instructors.

Undergrad students' answer: Yes, our instructors sent us questions in the form of assignment but only students that have computer or smart phones get the access to the activities. However, there was no online discussion so we didn't think of encouragement from our instructors. In general, we didn't receive any kind of encouragement.

Question 8: How have your instructors evaluated your online learning progress?

Grad students' answer: we graduate students were given assessment through tests, assignments and presentation of papers through online and final exam through face-to-face but the assessment was not uniform across the departments. Some of us took the assessment online and other of us took the assessment through offline after the pandemic.

Undergrad students' answer: concerning us, there was no online assessment except some online activities whereby some of us received activities while others didn't receive due to lack computer and/or internet access.

Question9: What are the major challenges you face in online learning? How often do you face them?

Grad students' answer: the major challenges we face during the implementation of online instruction were problem of internet connection, electric power cut, limited online technology skills, limited technical support, shortage of rooms for online teaching-learning, lack of motivation due to limited conducive environment and lack of online infrastructure in general. We often or sometimes encounter the above mentioned challenges during the implementation of online instruction.

Undergrad students' answer: we face challenges like problem of internet access, deficiency of online technology skills, lack of silent room for online learning, lack interest because we didn't have conducive environment and lack computers or smart phone for online learning. We regularly faced these challenges.

Question 10: What is your suggestion for effective implementation of online instruction in the future or ways of solving the challenges?

Grad and undergrad students' answer: ministry of education should make online mode delivery uniform across universities. Universities should create conducive environment and provide sufficient online infrastructure like internet connection and computing facilities. Before the starting online teaching-learning process, universities should give adequate online technology skills training to their students. The training should be given repeatedly so that the trainees develop online technology skills; it should not be given simply once in a year just for the sake of giving training. Regarding the future online instruction, using only online method is very difficult in our context, so it is better if universities use combination of online and offline method

Lastly, instructors should be given additional incentives since online instruction demands extra time and effort and this helps to boost their interest of implementing online instruction. In suggesting how online instruction will be used in the future, the respondents said that universities have to use combination of the two methods, blended method whereby online is used when it is possible and face-to-face when it is difficult to use the online mode. This is because using combination of the two methods is by far beneficial than using each separately.