ICT Tools and Applications Used in Online Education during COVID-19 Pandemic in Nepal: A Purposed Model using White Board

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Abstract: *Information communication technology (ICT) has a lot of benefits and utilization in human real life activities. One of the major sectors is education all over the world. Online education includes the use of digital tools and applications for teaching and learning procedure. The uses of technological tools which make empower students, teachers to teach and learn anytime and anywhere from any part of the universe. It became an ultimate organ of life for children, younger and elder too. This paper tries to discuss and analyze about the ICT tools like computers, the Internet, websites, mobile phones & applications, YouTube, and zoom. The study was accomplished by literature review and content analysis. The study concludes that the use of ICT tools and applications are being widely used in academic purpose during COVID-19 pandemic and these tools help teachers, learners and academic institutions for teaching learning activities. The study claims that the newly invention of digital accessories, ICT tools and applications, educational applications created serious problem to the students, teachers, institutions due to time to time upgrade the version of them. Due to poor economic conditions of the learners, teachers and institutions, they became unable to buy the upgraded version of the ICT tools and application. However, many of the students could not attend the online classes as well as teacher could not conduct the online classes. So, it became a serious issue in education sector in the globe. The study exposes that Facebook, close group, messenger, viber, Google meet, Google form, team, zoom, Skype, and What 'sap are mostly used for online class and they became popular among students and teachers in Nepal.*

Keywords: online education, e-learning, virtual learning, digital learning, COVID-19

1. Introduction

Information communication technology (ICT) has a lot of benefits and utilization in human real life activities. One of the major sectors is education all over the world. It became a fundamental organ of life for children, younger and elder too.

Since December 2019, all most countries of the world have been faced COVID-19 pandemic. It was seen in China at the first time. Due to its dangers affect, most of the countries went to lockdown. The governments of many countries decided to lockdown malls, markets, hotels, cinema hall, school, colleges and universities, party place, games and sports, meeting and conferences. As the consequence of the lockdowns, schools and universities in Nepal have been temporarily closed for nearly two months now UNESCO (2020) and they were opened for few months. But still COVID-19 second wave is spreading in many countries like Nepal and schools, colleges, malls, hotels and cinema halls are closed again (Giri 2021).

The use of ICT tools and applications has rapidly increased in the last two decades. Most of the people have touched the real value of ICT tools and applications during the covid-19 pandemic. They have played a key role during the COVID-19 crisis. Teachers and students started to use them widely for online teaching and learning purpose. The uses of ICT tools and application have a great role in refining the quantity and quality of teaching and learning process in both traditional and online education (Raad, Bareq & Khan, M. (2020).

The ICT tools and applications such as websites, YouTube channels, and webinars have been used during the covid-19 pandemic. These tools permitted teachers and learners to upload the teaching material on their academic websites and Google classroom, though others go for online teaching by using different applications such as zoom, Google meet, we meet and many more. Many of the teachers' and students' recorded videos and upload them either on YouTube or on other websites for their students and stakeholders to watch a video related to their subjects matters. The learners could easily find videos on YouTube talk about any topic as they want. They also able to access any website, and could find various subject matters related to their course curriculum in various format as pdf,. docx. etc and so on (Raad, Bareq & Khan, M. (2020).

Many of the study showed that during covid-19, the ICT tools and applications have played a vital role in online education. Most of the students used ICT tools to accomplish their assignments, reports, projects and send them via email or other means like Viber, Messenger, Whatapps etc. However, most schools, colleges and universities used the facilities of ICTs to set the question papers, conduct online examinations, result processing and evaluation (Bareq Raad Raheem, A. K., 2020).

After lock down in the country, education sector is highly affected and loose the education quality. Many of the students could not attend the online class due to lack of internet connectivity and digital technologies like computer, laptops and mobile phones. Power interruption is one of the major problems for online education. Most of the teachers are unable to conduct the online classes due to lack of technical training. New version of ICT tools and application

also made difficult to the teachers and students to play with it (Giri 2021).

The objective of this study is to explore the new ICT tools and applications which are used in online education during the COVID-19 pandemic. The content review, report analysis methodology is used to accomplish the study. The researcher has visited the seven provinces to collect the views of educationist, guardians, students and institutions. Research articles, text books, national and international journals, websites and newspapers are also used for literature review.

2. Literature Review

Online education system is not only the guide or moderator between teachers and learners but also a huge collection of learning materials (resources) with several learning tools and applications which learner could learn any subject themselves through as per their need and wish. Due to Covid-19, the relevance of online education is grooming not only in Nepal but also in the globe. Online education reflects their prospects and challenges during the implementation phase. The use of information and communication technology (ICT) in education sector has made changes in the accelerated development in learning and their delivery through online modality (Giri, 2020).

Online education system was used at the international level in the past by different academic institutes for students across the world. Students were earning international academic degrees from online education staying in their own country. Online education has been significantly popular at the international level after the impact of the Covid-19 pandemic around the world. Those students who were in a regular class in the institute with physical presence have left the country of the institute and staying in their home country. Now, they are studying online from home with the teachers of the institute so that they will not lose the academic years. Only the **g**iven such opportunities that online education provides for faculty, students, and institutions, the extent of responsiveness, it has received is not amazing but also it is the ground reality (UN, 2020).

Technologies both hardware and software makes the teaching-learning curious. Advanced technologies have a great scope in improving the education processes. Technologies guide teaching learning process to teacher and students. IT has brought about revolutionary changes in the education by changing the processing of learning with technologies. Modern computer technology has opened the gates for classroom communication with colleges and teachers (Giri, 2020).

2.1 Information Communication Technology (ICT) and Online Education

ICT is used to creates, process, store, display, and share information by electronic Medias. There are various technologies such as a computer, television, mobile phone etc. whereas email, blog, and videoconferencing considered as equipment and services associated with technologies. The features of ICT tools and application made education

boundless. Many learners could choose any courses from anywhere of the globe and they could able to get online degree through online education Ghavifekr, S. & Rosdy, W. A. W. (2015)

Since 21 century, ICT has been used in education as a supporting device. All the government has used ICT as a tool in an education to enhance their education's quality. Online education is being a new teaching learning pedagogy. It promoted the quality of the education in present era. Though these tools help the learners, teachers, researchers, academicians and institutions to develop their skills and knowledge Ghavifekr, S. & Rosdy, W. A. W. (2015)

Use of modern digital technologies in online education is not a recent event. The study has found that the ICT tools and applications have helped learners to get knowledge and skills, establish a network and an interaction with other learners and broader their minds on different sectors of the globe and a fashionable day-to-day lifestyle (Farr & Murray, 2016; Healey, 2016).

Though, modern technologies are being more affordable, ICTs are still an innovation for the school level teachers, higher education teachers and students in Nepal. The new technologies are accessible to teachers and students such as mobile phones, tablets, laptops and computers and which are used for communication, learning and entertainment purposes and so on (Suman Laudari, 2018).

2.2 Online Education in Nepal.

With the ouster of the Rana regime in1950, all successive governments in Nepal have been put a lot of emphasis on uplifting the education of the country. The Ministry of Education was established for the development of education in the country in 1952 mainly school education. Alongside, ICT has emerged as one of the priority areas in the last two decades. This is evident from the fact that the Government of Nepal has come up with a format ICT Policy in 2010 and a Master Plan from ICT in education 2013 (Karki Hitesh, 2019).

Online education has been significantly popular in Nepal in recent days after the impact of the Covid-19 pandemic across the country. The government has asked for all the academic institutions to close the physical presence of students and teachers in the class. In this situation, only online education has been the alternative to carry on the teaching-learning activities. Teachers are teaching from their residence to the students staying at home. Different applications like Zoom Cloud Meeting, Google Meet, Google Classroom, Microsoft Team, Skype etc. have been used for online teaching-learning purposes via the internet. The teachers use desktop and laptop computers for teaching purposes and students use desktop or laptop computers or smart devices for the online learning purpose in the real-time taught by the respective teacher (Giri 2020).

Learners have been using different learning devices during online class. In this case researcher has asked the given question to the student for their view. But now, due to development of modern ICT accessories and application

made online education chief and best. It has decreased the discrimination of education to the learners. The teachers use desktop and laptop computers for teaching purposes and students use desktop or laptop computers or smart devices for the online learning purpose in the real-time taught by the respective teacher (Giri, 2020).

Actually, Computer, laptops, smarts phones and internet are being very crucial things for online education. Very less guardians have such opportunity to access buy these devices. Not formal course curriculum and training for teachers in till these days in Nepal (Basnet, 2020).

2.3 ICT Tools for online education during COVID-19

Digital technology integration has gone through innovations and transformed our societies that have totally changed the way people think, work and live nowadays (Grabe, 2007). The use of ICT is unexpectedly being popular to many teachers, learners, schools level, university level and other professional academic institutions in Nepal. However, mobile phones, laptops are connected with internet to use social media by teenagers to establish relation between friends, teachers and other stakeholders (Khanal & Rijal, 2016).

The counties which are technologically advanced, like Italy, France, Germany, Australia, the UK, and the US, have adopted online education during covid-19. They quickly improved their online learning platforms to create common distance learning center portals and provided students access to e-content and source through mobile devices. Many countries, all stakeholders, institutions, teachers, publishers, and parents have joined their hands together to create digital resources so that they could be delivered through virtual classrooms (Azzi-Huck & Shmis, 2020). They further stated that China and India have both established national e-learning portals with access to the national repository of learning resources for parents, teachers, students, and education administrators. In addition, China has adapted flexible online teaching methodologies to facilitate learning. A few digital tools that teachers and students can control by using their mobile phones, computers, laptops and tablets and internet connection with them (Suman Laudari, 2018).

It is clear that the COVID-19 pandemic has created some sort of educational disorder. The government has no safe grip of the educational system. It is found that the majorities of students have almost no access to technology and provide some e-learning platforms to those students who have access to technology. The Government of Nepal has recently launched the unitary e-education postal under its Ministry of Education, Science and Technology. There exist different online teaching-learning systems provided by different institutions, both public and private separately (Dawadi et. al 2020).

The countries without sufficient infrastructure are turning to traditional technologies, such as radio and TV. South American countries like Argentina, Chile, and Brazil, where access to internet and internet connectivity is a major issue. The Concern ministries have used a combination of new technologies like mobile and traditional technologies to

deliver lessons and resources to the learners. Radio, television, YouTube channels, recorded lessons and digital educational resources and materials on demand are combined together to provide lessons to students who do not have reliable access to the internet. Adopting a similar approach, Indonesia and Malaysia have mobilized all major technology providers, internet providers and TV communication channels to join hands of their ministries to provide live education programs for students as well as teachers. Similarly, Malaysia has launched a new TV channel to deliver education through TV programs to all students, especially those without Internet access. These programs are also live-streamed on the Ministry's online learning platform which offers access to on-demand content as well as digital textbooks (IAU 2020). Emailing, conferencing, chatting, working together via Google drive, Google doc, Google hangout, dropbox, facebook, Twitter, etc. have been widely used in online classrooms (Giri, 2020).

2.3.1 Facebook and Closed Groups
Now, lower secondary and higher secondary students and all most teachers have their Facebook profile. Teachers can reap the benefits of this fact by creating closed Facebook groups for their classes and inviting students to participate in the discussion. Teachers can post questions, teaching materials, encourage students to post questions and engage students in group discussion. Same way, the teacher can leave messages or assignment tips, project work for students on such pages such that the students feel supported. Such use not only shows teachers' awareness of the local context and use of technology, but also motivates students and enhances their concentration in their classes. The study showed that the use of 'Facebook groups' in writing lessons can enhance students' knowledge and skills and can be useful in the brainstorming of ideas before the actual writing began (Suman Laudari, 2018).

2.3.2 Messaging Services:
Different messaging services as Facebook Messenger, Telegram, Whats app, Viber and Skype can be used for off–the-class discussion with students. Now a days, most of the messaging services allow you to create groups and add members. By creating a group for classes and inviting learners to such virtual classes in the messaging services, teachers can share resources, project works, tips, ask and answer questions and help students by boosting them to participate in online discussion. In a recent study conducted by Bani-Hani, Al-Sobh, and Abu-Melhim (2014), the authors found that Facebook groups can be effective in online learning because such groups can help to share the knowledge and learning materials too (Suman Laudari, 2018). .

2.3.3 Google Drive/One Drive (or other Cloud Based Platforms)
Teachers and students are enabling to, preferably, a personal computer, laptops, smart phones and a stable connection can also use cloud based platforms, i. e. Google Drive/One Drive/ Drop Box Paper, for collaborative work, such as project work. Teachers could invite students to work and see the real-time progress of the student's job.

2.3.4 Google Form (Self-Grading Quiz)

Teachers can create self-grading quizzes for students on Google Form and share those on Facebook Closed Groups or Messaging Services. The self-grading quizzes give options of customizing the exercises to student's needs. Thus, such quizzes could be used to revise the lessons or as tests. There are different benefits of such tests. The first thing is that such quizzes save teachers' time. Secondly, the teachers can find the individual scores of students in a glimpse and print them on Excel. Third, anybody can see how students performed in each quest ion. If the teacher sets a question of a higher difficulty level, then she/he can identify those by skimming through visuals in the 'responses' section. Fourth, the teachers do not need to worry about revising the test items on the papers. Because the test is already on the Google Drive, she/he can twist and use them in the following terms/semesters/years. Fifth, such tests can be accessed and completed on a mobile phone. Students without any personal computers can also complete the test.

2.3.5 Skype/Viber

Teachers could able to use Skype/Viber for collaboration or to enable learners to interact with teachers and friends. They can pass voice, video, graphics and text message to each other very shortly. It is more effective for learners.

3. Purposed model for online education using white board

According to Chinta Mani Baral, Chief Engineer Nepal Television suggested that online teaching using White Board is quite effective and gives feeling of Physical Class for both Students and the teacher. Teachers can draw any types of drawings and write any mathematical equations or expressions on White Board using Board Markers in the virtual class. He further stated that students can copy the content from the White Board and understand the content explained by the teacher about the topic simultaneously. This methodology has been found very effective for theoretical and mathematical subjects in whom teaching is not effective using screen sharing of computers for students. However, there is cost involved in this methodology to manage the technology for this type of online teaching method in the virtual class. The architectural design, requirements for the management of the technology in the virtual class is as mentioned.

3.1 Architectural Design

Chinta Mani Baral expressed and assures that a full HD Camera with HDMI (High Definition Multimedia Interface) is connected with HDMI to USB 3.0 converter so that the HD video output of the White Board and Teacher in the USB 3.0 cable is connected as input in the USB 3.0 Port of the Computer. The Zoom Cloud Meeting Application is run in the Computer with video available from the Camera. The audio input is selected according to the audio input source used connected to the microphone and audio output will be as default connected to the speaker. In case of Laptop, USB to Audio device is used for as Interface for Microphone as well as for external speakers. The wireless microphone is connected with Wireless Transmitter and output of the Wireless Receiver is connected to the USB to Audio device connected in the USB port of the Computer. The external Speaker is connected in the Speaker port of the USB to Audio Device.
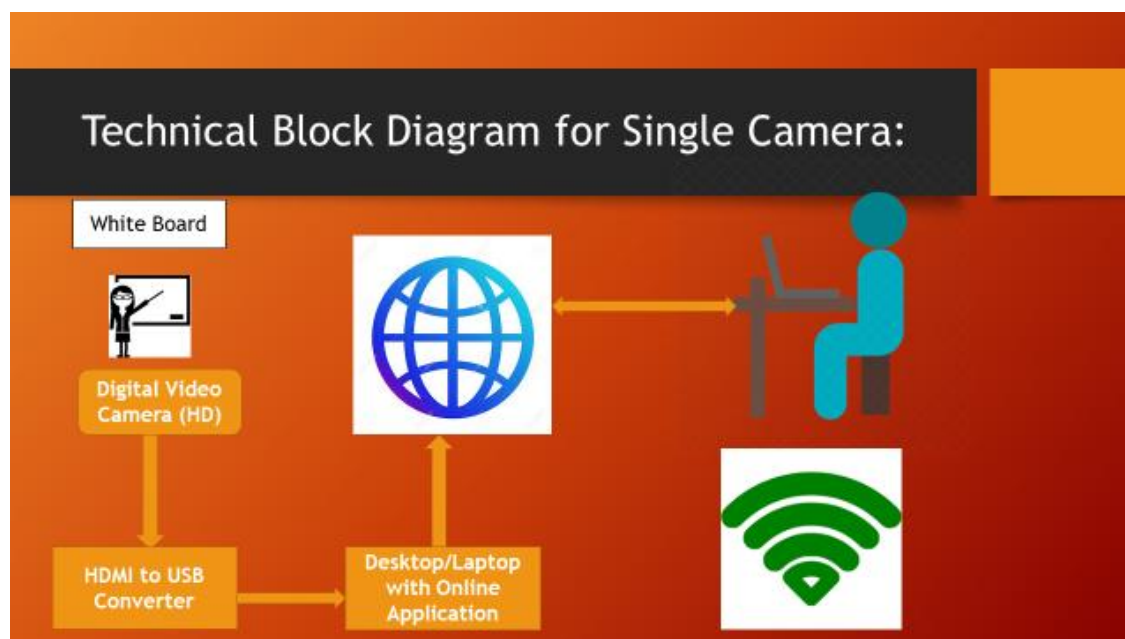

Figure 1: The Architectural Design for the Virtual Class using White Board

The real picture of the Virtual Class using the above mentioned technology is as below:

Virtual Class Room for Real-time Teaching

The required Equipment and tentative cost for the Online Class using White Board is as below:

3.2 Equipment for Online Teaching Class using White Board

S. N.	Requirement	Specification
1.	Digital Camera	Full HD (1920X1080), HDMI Output Port, Manual Focus with View Finder, Battery Backup and DC Power Input
2.	Tripod	Tripod with Base plate compatible to Camera Fitting, Height Adjustable from 50 cm to 150 cm), Load bearing (1Kg-3 Kg)
3.	HDMI to USB Converter	HDMI Input Port, USB 3.0 Output Port, Video Supporting Full HD (1920X1080),
4.	Desktop/ Laptop Computer	I7 Processor, 8GB RAM, USB 3.0 Ports, at least 17" LED Display, Windows10 OS with License
5.	Wireless Microphone System	Pin Mic, Wireless Transmitter, Wireless Receiver
6.	Speaker	USB Speaker with woofer
7.	White Board	3"X5"
8.	Zoom Cloud Meetings Apps	Standard with License for a Year
9.	Cables and Connectors, Power Sockets	HDMI Cable, USB Cable, Audio Cable, Power Sockets etc.
10.	Furniture	A Table to place Equipment and a Chair

4. Discussion

How could we develop ICT infrastructure in rural area of Nepal? The interruption of electricity is the major problem for online education. How could students manage the power backup? Internet facility and high bandwidth also the challenges for online education. How students could manage it? All the teaching staffs are not well trained in online learning-teaching. How could institutions provide training to them? Online learning devices and applications are not easily available in rural area of Nepal. How poor guardians and institutions could manage it for online classes. Online education is providing equal access to all for education. But how to make it easy and costless to all citizens in underdeveloped country like Nepal.

5. Conclusion

The use of ICT tools and applications are being widely used in academic purpose during COVID-19 pandemic and these tools help teachers, learners and academic institutions for teaching learning activities. The study claims that the newly invention of digital accessories, ICT tools and applications, educational applications created serious problem to the students, teachers, institutions due to time to time upgrade the version of them. Due to poor economic conditions of the learners, teachers and institutions, they became unable to buy the upgraded version of the electronic gadgets and application. However, many of the students could not attend the online classes as well as teacher could not conduct the online classes due to these problems. The study exposes that Facebook, close group, messenger, viber, Google meet, Google form, team, zoom, Skype, and What 'sap are mostly used for online class and they became popular among students and teachers in Nepal.

6. Recommendations

For online teaching, a suitable online application is installed on a laptop or desktop computer with an internet connection. The ready-made teaching content is prepared generally in **pdf** format and the screen is shared for the students. Students are also recommended to use desktop or laptop computers rather than smartphones so that they will have a

big-sized screen to read the content easily shared by the teacher. The content to teach can be stored in Hard Drive or Google Drive for future use. Another method is to use White Board rather than sharing readymade content stored on the computer. The Teacher can write on the whiteboard and the White Board is shot by the special Web Camera or Digital Video Camera connected to the computer so that the students can watch the content written by the teacher on the White Board on their Screen. This method is quite effective and students feel like real class teaching-learning activities of the school.

7. Way Forward

The Government of Nepal is successes in information, communication and technology development in the Nation but its utilization is not adopted by the people due to their poor economic, education and geographical diversity as well as irregular power supply and poor internet connectivity Giri, Shailendra. (2018).

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