

A comparison of online video conference platforms: Their contributions to education during COVID-19 pandemic

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Abstract

COVID-19 has brought dramatic changes in the ways our day-to-day activities are carried out in recent times. Education was also affected. Online education was adopted as a means to administer teaching and learning. There are numerous online video conference platforms currently available to assist education. Nevertheless, with these platforms are various features with their inherent advantages and disadvantages. Choosing the suitable ones to meet the need of users could be a daunting task. This study utilized a comparative research method to compare features; maximum participants meeting recording duration, security, chat/screen sharing, meeting duration, archive meeting, trial versions, account creation to use and mobility, of seven online video conference platforms; Google Meet, Microsoft Teams, GoToMeeting, Cisco WebEx Meetings, Zoom Meetings, ClickMeetings and BigBlueButton. The comparative results of the study found that each online video conference platform included in the study has various beneficial features for teachers and students. Teachers should analyze carefully all features of each online video conference platforms feature, to select a suitable platform for students and course content needs. This study would aid learners, instructors and educational institutions to choose from the numerous platforms, to suit the specific needs and usage during this pandemic period and beyond.

Keywords: Online video conference platform, online classrooms, online video conference platform, e-learning, Covid-19

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1. Introduction

The outbreak of the coronavirus interrupted and altered the way business and the way activities are conducted in our daily lives during most parts of 2020. The educational sector was also affected by the COVID-19 pandemic just as every other sector (Dhawan, 2020). The mode of teaching was altered from face-to-face teaching and learning to online learning as governments for various countries attempted to minimize the spread of the coronavirus, by putting into practice social distance to limit human contacts and physical interaction. Immigration for students from one country to other, face-to-face teaching and learning among other activities were restricted by many governments to curtail the spread of the virus (Fung & Lam, 2020). Interventions such as substituting the traditional form of education with social media, online video conference platforms, e-learning platforms, radio and television broadcasting programs as well as other means of distance learning were implemented. In spite of these measures taken by some institutions to ensure continuity of education, schools were utterly shut down because they were unprepared and unable to absorb the sudden change in trend of activities (Ahmad & Zabadi, 2020).

The changes COVID-19 brought to the way teaching and learning was conducted, has adverse effects on students, teachers and the educational system as a whole. Some of these advantageous effects are: There has been immense flexibility, accessibility to resources and time management with the current trend of online classrooms. Administering and managing education has also encountered great amount of flexibility (Cavus et al., 2021). Irrespective of the time, student can access course materials and lessons at their own comfort, contrary to the traditional face-to-face education (Hass & Joseph, 2018). Students have been faced with the challenge of learning and improving on their self-tutelage, which is an essential competency that must be encourage among learner (Nicola et al., 2020). Jena (2020) further mentioned that, this pandemic has brought a change in practical hands-on laboratory teaching learning is carried out. Application developers have heightened the use of virtual reality and augmented reality to enhance these areas of learning. Which would make dangerous and expensive laboratory studies easier and affordable to dispense (Sher et al., 2017). Attention on marks accumulations, by memorizing course material by students have been shifted to understanding the materials, and writing case studies projects on the subject matter. This would go a long way to assist students in understanding information and implement them in their career later in life. The dependency of online education on the Internet has forced governments and Internet service providers to increase Internet speed all over the world. Education in general has become accessible to all, more than it was before (Machado et al., 2020).

Contrary to these advantages, the pandemic had some devastating effects on education due to the fact that most institution were not prepared for such an abrupt change. For instance, in conducting exams and test, students are tempted to cheat since there is a limited surveillance by instructors. Practical hands-on laboratory courses were difficult to undertake because of the abolishing of face-to-face teaching and learning (Karataş & Tuncer, 2020). Kavčič et al. (2020) emphasized that, psychomotor skills of students were affected which, is very essential in such practical courses. Individuals with special educational needs such as the deaf, blind and autism student just to mention a few, were difficult and almost impossible to be thought. And the longer their education was suspended the more they forgot all that would have been thought them (Lan et al., 2018). Speed, availability and ubiquity of Internet and electricity in various parts of the world was a major concern that impacted negatively on the current online learning (Ebert et al., 2019). The attention span of students has also reduced greatly because they have to use devices connected to the Internet for studies, they are easily disrupted (Putri et al., 2020).

The COVID-19 pandemic affected all sectors of our lives. This caused changes in the way activities are carried out in the banking, health, transportation, hospitality sectors, and education just to mention a few. The situation called for a break in all activities in the various sectors of our lives. However, when education is halted over a period of time, students find it difficult getting back on track. For this reason, most of the educational institutions from the basic, second cycle and the tertiary institutions made efforts to transfer educational activities to online platforms. These online platforms include Learning Management Systems, social media platforms and the likes. Teachers in the educational sector started migrating from the traditional learning strategies to e-learning blended learning and mobile learning strategies implemented for distant learning as well as online education. This type of learning requires effective communication between teachers and students as well as among students. As a result of this, distant learning, e-learning, and mobile learning are fast becoming the means of dispensing education in recent times. Learning management systems had gotten popular, which gives abilities to achieve learning activities like a traditional classroom. Nevertheless, teachers and students require online video conference platforms to make effective and interactive communication during online lectures. This study aims at aiding educators, learners as well as educational institutions to easily choose the most suitable online video conference platform for their specific need.

2. Theoretical Framework

2.1 E-Learning

The provision of education with the help of digital resources known as e-learning or electronic learning. Despite the fact that e-learning has its foundations based on traditional formal instructions of education, it is distributed via the use of computers, tablets and even mobile phones that has Internet connectivity. This helps users to learn everywhere, anytime, with few restrictions, if any (Uzunboylu, Cavus & Ercag, 2009). Rosenberg (2005) mentioned that, the term e-learning was first formulated by Elliott Maisie. The Internet has been a major facilitator to the rapid growth and use of e-learning. Additionally, advancement in the development in multimedia, that is audio-visuals, animations, images and graphics has also been a contributing factor to the growth of e-learning. It has made the use of e-learning more engaging and interactive. The production of affordable, portable digital devices in recent times has made e-learning and mobile learning gained the popularity it has attained in recent years (Kundu & Dey, 2018). An equally important factor that has added to the development of both e-learning and mobile learning is the advancement in the development in learning management systems (LMS). The intricate development of recent LMS, its migration from local installation to cloud based systems, as well as their functionalities designed to suit the needs of institutions and individuals, has added to the increase in the use of e-learning in education (Cavus, Uzunboylu & Ibrahim, 2007; Bozkurt et al., 2020; Ojuawo & Awosanya, 2020).

2.2 Online Video Conference Platforms

Curtailling the unfavorable effects of COVID-19 on education, online teaching with online video conference platforms were employed during the period by many institutions across the world (Basilaia & Kvavadze, 2020). Mukhtar (2020) in his study outlined that, there are various advantages of online education to aid in the continuity of education during the covid pandemic, these advantages promoted flexibility and student-centered learning (Mukhtar, 2020). Fortunately, there are wide variety of them to choose from depending on the institutional and individual needs. Using these tools, the modification of contents that were previously taught face-to-face is easily conceivable. Some advantages that come with the use of online video conference platforms stressed by Chadha (2018) and Dung (2020) includes:

- Students are able to flexibly use their time at their own pace to assimilate the course content.

- Learning can take place irrespective of proximity of both teachers and students.
- The use of online teaching tools ensures real-time learning and teaching.
- It has as well improved communication and teamwork.
- The online education tends to be affordable that the traditional forms of education.
- It is accessible to all by the use of smart devices, scalable and ubiquitous.
- Online education has forced students and teachers to improve their use of technology in learning due to digitalized and smart classrooms.
- The current trend in education has among many things brought exposure to of educators to global audience because they can upload lessons online.
- This method of teaching is affordable because the cost of setting up an online class room is much lower than that of a physical classroom.

Contrary to the advantages that come with online learning were mentioned by Dumford and Miller (2018) includes:

- The accuracy in assessing and evaluating the performance of students and comparing them to student who has in-person education in years past.
- Some students and teachers are not technologically equipped to be able to adopt to the current trend of education.
- In some cases, it is difficult for teachers to control students in a class, since they may not see all of them at the same time.

Considering these disadvantages and selecting online video conference platforms that will be least affected by the negativities is of great importance for online education to be successful. Because there are numerous online video conference platforms currently available. They come with various features with their inherent advantages and disadvantages. Going through them and choosing the suitable ones to meet the need of users could be a daunting task. Some scholars have tried to compare and assist users to choose between these online video conference platforms. They however did not consider uniquely the features and the very platforms been consider in this study. This study, therefore, seeks to assist students and teachers by comparing the listed online video conference platforms, it is intended to help them to choose between the listed platforms based on the most important features and their inherent advantages, to suit their needs during this COVID-19 period and beyond within the scope of e-learning.

3. Methodology

3.1 Research Model

In this study, various features of the chosen online video conference platforms were considered and compared with the aim of outlining their advantages over each other. For this reason, the comparative research method was used. Because a comparative study is usually conducted by means of collating descriptive features of a subject in other to enhance knowledge about the subject in question. It can as well be described as the means by which relations between phenomena can be checked and rated (Levitt, 2018). In this research, the two authors independently accessed all the listed online video conference platforms, the features were examined to ascertain their educational support. Data collected was later collated and compared.

3.2 Choosing Online Video Conference Platforms

The detection in three phases of the software programs used for that review: (i) identifying the popular platforms through a Google search; (ii) reviewing the literatures that had made studies on these platforms used by researchers; (iii) implement inclusion and exclusion criteria to limit our focus to video Conference programs that were used in this study. Approximately 15 of the most popular online video conference platforms were assessed with their features. GoToMeeting, Cisco WebEx Meetings, Microsoft Teams, Google Meet, Zoom Meetings and ClickMeetings were chosen.

3.3 Choosing features of Online Video Conference Platforms

The choice was based on the consideration of a number of features such as free versions, maximum participants number, meeting recording/duration, security features, chat, screen shearing, account creation to use, mobility, trial/original version, cost prices, meeting duration, archive meeting, high video quality. Looking at the websites of chosen online video conference platforms such as GoToMeeting, Cisco WebEx Meetings, Microsoft Teams, Google Meet, Zoom Meetings, ClickMeetings, BigBlueButton to extract information on their latest stable versions and their user base. To compare and contrast the findings, these six were chosen because they have become popular open-source online video conference platforms in recent times.

4. Results

4.1 Maximum participants

In a big class, in which students are internationally spread, the task of keeping everyone engaged and working as one coherent class to promote effective and efficient learning might be overwhelming. Large calls pose special issues and are sometimes the limit of free video conferencing services. Choosing an online video conference platforms that can safely manage huge calls is thus a critical consideration (Mukhtar, 2020). The maximum number of participants vary from platform to platform as shown in Table 1. Any Google account holder can initiate a Google meeting on the Google Meet platform and invite as much as 100 participants, same as in cases of Zoom Meetings, Cisco WebEx Meetings and BigBlueButton. Microsoft Teams and GoToMeetings has the capability to allow 300 and 250 respectively. In all the platforms, the number of participants increases when some terms of payments are met.

4.2 Meeting Recording Duration

There are obstacles, but also possibilities, with this transition in communication channels. It's now easier than ever for a teacher to record a class on online video conference platforms, for instance. Recording equipment might be clumsy and difficult to operate while in a face-to-face in-person meeting. It is as easy as pressing a button on the host device to record an online call. Recording an online class or lecture may provide a variety of benefits in teaching and learning, including administrative support, official recordkeeping, and improved communication (Archibald, 2019). The free/trial versions of chosen online video conference platforms permit recording of meetings. Cisco WebEx Meetings, GoToMeeting, and ClickMeetings allows 24 hours, 40 minutes and 30 minutes of recording duration respectively. Google Meet, Microsoft Teams and Zoom Meetings do not allow recording of the meetings when not paid for. Conversely, BigBlueButton allows recording of video meetings. Cisco allows a host to record and save on host's local computer, cloud storage is not available for unpaid users.

4.3 Security

Amin and Sundari (2020) mentioned in their study that, during a video conference call, it is expected to have a high-level secure call experience that protects your personal data and information, as well as the content of your meeting. When conducting a conference call for lecture, the teacher may want to know

that security concerns like unwelcome guests, “Zoombombing”, and camera hacking are reduced, if not eliminated entirely. One must ensure that the chosen online video conference platforms have dependable features that give peace of mind every time conducting on engage online to reduce security concerns while increasing connectivity. People need to feel secure in the technology they use on a daily basis when joining an online class. All the online video meeting platforms have various levels of security and protective measures in place, to protect users from hacking attacks. Zoom for instance, uses an amalgamation of before meeting and during meeting configurations to ensure privacy of the meetings. It is worth mentioning however that, the end-to-end encryption of Zoom is not strongly implemented as other platforms. GoToMeeting on the other hand, has stronger encryption system. The platform uses as advanced Transport Layer Security and a 256-bit encryption standard to ensure that, information is properly encrypted and secured of storage on the platform. Similarly, Google Meet generates exclusive encryption key for every participant of every meeting. This is broadcasted as Remote Procedure Call in an encrypted format and it last for the duration of the meeting. Microsoft Teams and WebEx online video conference platforms both use trusted techniques to ensure end-to-end security by encrypting data during meetings. ClickMeeting online video conference platforms offers opportunity for host to create password of each meeting, in the bid for provide variety of access to meeting rooms. Unique tokens are also generated for each participant. Similar to ClickMeeting, BigBlueButton provides a variety of security by encrypting contents of meetings sent to their server. This is attained by the utilization of Transport Layer Security certificate generation during installation.

4.4 Chat/Screen Sharing

A screen sharing tool enables real-time workplace collaboration with a large number of participants in an online classroom. Students may immediately see what others are viewing by sharing the same screen material, such as a graph, chart, or photograph. Meeting time is reduced since the screen sharing program eliminates time spent by the teacher to explain (Veres, 2020). Mostly, all the chosen online video conference platforms allow audio, video, slide and sharing. ClickMeeting and GoToMeeting permit private chats as well as chatting with the entire meeting. The host can partially control a meeting attendants screen with the share screen options. Zoom on the other hand permits sharing of entire screen, the sharing of specific applications during a meeting as well as sharing multiple programs simultaneously. The host has the option of preventing a participant from chatting during a meeting. Cisco meeting allow HD video, audio and screen sharing. A chat message sent to a Google Meet prowl to a participant joining the meeting, is usually not seen by the participant, and all chat vanishes when the meeting is ended.

4.5 Account Creation to Use

Wlodarczyk et al. (2020) mentioned that, among other advantages account creation to use online video platform may bring to the user is, it helps develop a more meaningful and engaged relationship between them and the platform. Account creation enable online video conference platforms to learn about the individual user’s settings and adapt the personalized user experience.

It is not compulsory to have a Google, Zoom, Cisco WebEx Meetings and BigBlueButton account in order to join an organized meeting on those platforms. Nonetheless, if a participant does not have an account, they must be granted entry in to the meeting by host of the meeting. Similar to the aforementioned platforms, a participant can join a GoToMeeting, ClickMeeting and Microsoft Team meeting without an account from any device as attendee. The participant would however need an account to initiate a meeting.

4.6 Meeting Duration

The meeting duration of the trial and paid version of the platform vary widely. However, this study was based on free versions of the online video conference platforms. Google Meet and BigBlueButton last for sixty minutes. While GoToMeeting, Zoom Meetings, and ClickMeetings take forty minutes to restart the meeting. Microsoft Teams on the other hand, last for 24 hours before a meeting would be restarted. Cisco WebEx Meetings offers fifty minutes for its free meetings.

4.7 Mobility

Mobility is another important feature to consider when choosing an online video conference platform. It is the ability for a participant to attend a meeting from a mobile device, be it an Android or IOS device. With all the online video conference platforms, a participant attending the meeting, can do so with from an iPad, iPhone, or any Android device. They can as well attend from a laptop or personal computer via respective platforms applications or any browser.

4.8 Cost Prices

In as much as the prices of these chosen platforms vary from time to time. The stated prices in this research are limited to the period between March 2021 and May 2021. These were the prices found at the time of this research. There are assorted prices for different product and serviced of the various online video conference platforms. For Google products and services, the workspace essentials requires and amount of 80 USD monthly per an active user. Microsoft Teams as well has a variety of products. The 365-business basic and standard requires payment of 5 USD and 12.50 USD respectively for an annual fee. The office 365 E3 cost 20 USD also for annual subscription. GoToMeet on the other hand has two payment plans, 12 USD and 16 USD monthly, 144 USD and 192 USD annually for the professional and business respectively. It is worth mentioning that, the maximum participants for professional are 150. Zoom as well has different packages, with their prices been 149.90, 199.90 and 350 USD per a year for usage of Small Teams, Business and United Business respectively. Likewise, ClickMeetings apart from the trial version has three packages which are billed monthly. 25 USD, 40 USD and customed amount for the Live, Automated and Enterprise respectively.

4.9 Archive Meeting

All the online video conference platform has means of storing a recorded meeting in various ways. Some permits saving of the meeting in the local computer for the free versions. And, meeting on paid version can be stored on line in using the cloud services of the various platforms. Google Meet allow the meeting to be stored in the google drive of the organizer of the meeting and the link shared later. However, if cases where the meeting does not hold as scheduled, a link of the recorded meeting is forwarded to the organizer of the meeting. Microsoft Teams meeting on the other hand permits meeting to archived in their cloud services. It additionally has the ability to reactivate and restoration of a deleted archive. GoToMeeting's cloud recordings are automatically saved on the cloud when this option is activated. Videos of the recorded meeting can later be reviewed by participants. Similarly, Cisco WebEx Meetings has the same capabilities for recorded videos to be downloaded to participants local computers for review when the need arises. Furthermore, chat during the meeting can be stored on the local computers of the host. Zoom in a like manner saves archived meetings for seven days before allowing deletion when requested by the host. Chats can additionally be stored for a period of ten years in Zoom's cloud. ClickMeeting has separate storage for recording and storage for archives. Stored recorded videos can be move to from of the archives. BigBlueButton identically saves chats, PowerPoint presentations whiteboard events during their meeting in the cloud.

4.10 Trial Versions

Unpaid versions of all the online video conference platforms are available, ranging from seven days to unlimited number of days. However, their usage is limited to some features. Cisco WebEx Meetings offers a seven days usage of the platform. Cisco WebEx Meetings and Google Meet gives unlimited trial usage. GoToMeeting allows user to freely use their platform for fourteen days, after which the user is asked to paid for better experiences. Microsoft Team rather offers a considerably longer period of time for free usage. It offers six months of free service after which the user is required to pay for the services. Interestingly, Zoom gives free unlimited usage of the trial version of the platform.

Table 1: Tabulate the information of features of chosen online video conference platform

Features /Platforms	Google Meet	Microsoft Teams	GoToMeeting	Cisco WebEx Meetings	Zoom Meetings	ClickMeetings	BigBlueButton
Maximum participants	100	300	250	100	100	25	100
Meeting Recording Duration	Limited	Limited	40 min	24 hours	30 min	30 min	Unlimited
Security	√	√	√	√	√	√	√
Chat/Screen sharing	√/√	√/√	√/√	√/√	√/√	√/√	√/√
Meeting duration	60 min	24 hours	40 min	50 min	40min	40 min	60 min
Archive meeting	√	√	√	√	√	√	√
Trial versions	Unlimited	6 months	14 days trial	7 days trial	Unlimited one-on-one Meetings	30 days trial	7 days
Account Creation to Use	Not required	Not required	Not required	Not required	Not required	Not required	Not required
Mobility	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.

6. Discussion

COVID-19 has brought dramatic changes into the ways our day-to-day activities are carried out in recent times. The way education is conducted has also been affected immensely, because government over the world has been implementing social distance among humans to reduce the spread of this virus. This has propelled the mood of education to go online and adopt e-learning as means to administer teaching and learning (Correia, Liu & Xu, 2020). Online video conference platforms have inevitably become the

alternative means to continue education. There are many of such platforms and sometimes going through the process of choosing one that suites the need and use of an individual could be a daunting task. The aim of this study was to assist students, instructors and educational institutions in choosing the best suitable online video conference platform for their individual needs.

The comparative results pointed out that Google Meet and Zoom offer the longest free usage to the platform than the others just by creating an account on either of the platforms. In contrast, Cisco WebEx Meetings has the least number of days for the utilization of the trial version. Secondly, Microsoft Teams from the research, gives ample time for meetings and therefore would be good for government tertiary institutions or tertiary institutions in third world countries who would like to utilize free online video place, granted that lesson in the tertiary level usually last more than sixty minutes. Also, Google Meet, Cisco WebEx Meetings, and BigBlueButton offer a fair amount of time before a meeting would be started. They, therefore, can be used in both the second cycle and tertiary institutions. Moreover, GoToMeeting, Zoom Meetings and ClickMeetings grants 40 minutes which would appropriate for basic schools, since lesson in basic schools are supposed to be relatively short because the attention span students of that age. Chaka (2020) made mention that, users having the chance to utilize the free version of video conference platform helps them to decide whether to purchase the premium versions or not. It further helps them use the platforms when they do not have the financial capabilities to do so.

On the other hand, Microsoft Teams and GoToMeeting allow a sizable number of students which would be suitable for large class sizes. Google Meet Cisco WebEx Meetings, Zoom Meetings, and BigBlueButton would be also suitable for aggregate and large sizes of classes. In contrast, ClickMeetings offers 25 participants the opportunity to be part of a meeting, this makes it suitable mostly for small class sizes and meetings. Knapp (2018) mentioned that, in some cases having students in smaller groups is an added advantage to teaching. It makes it easier to shearing, discussing and later merging the smaller groups, so that student's knowledge on a subject matter can me assessed by the teacher. As supposed to their answers been influenced by their colleagues in class.

Moreover, ClickMeetings, GoToMeeting and Cisco WebEx Meetings allow the host of the meeting to record the meeting on a local computer. This would allow participants to review lessons at their own comfortable time and be able to comprehend the lesson later. In the instances that a lecture has an emergency to attend to, the class can be recorded and saved to the platform for students to watch at their convenience to avoid class time lost. Recording an online class facilitates effective official record keeping of the lecture. This also help the students to have access to previous lessons for references at their convenience. It also helps students to be able to revise (Yoshioka 2021).

6. Conclusion and Recommendations

There are numerous online video conference platforms currently on the internet. Nonetheless, each of them has their pros and cons, it is therefore important for teachers and students to be able to choose the appropriate online video conference platform that caters for their own needs and functionalities. In most cases, selecting the appropriate online video conference platform to suit the needs of the teacher and student may be a tedious task. For these reasons, this study utilized a comparative research method to compare some of the most popular online video conference platforms based on the chosen features. The result of this study revealed that, all the selected online video conference platforms have their various advantageous features. Needs of teachers and student (users of these online video conference) are not similar, they all have peculiar needs based on their teaching style, course content, personality etc. It is therefore essential for the lecture to select the suitable platform for their needs. This study aims at helping teachers, students and educational institutions to make informed decision on the right platform for them, thereby making the selection process easier and more accurate.

These results are limited with the chosen online video conference platforms and the chosen features. Like other scientific studies, there are some limitations in the study. Firstly, monetary constraints prevent students and schools from accessing the online video conference platform, this hinders an honest review of use of the paid online video conference platforms. So that, the study is limited to the chosen open-source/free trial version online video conference platforms. In the future, more researches should be carried in this field of study by comparing more online video meeting platforms (open-source and commercial) and examining more features. This would make the choosing process for learners, instructors, and educational institutions easier, thereby enhancing learning, education, and passing of knowledge to the future generation of the digital world.

Consequently, it can be said that when the online video conference platform wants to choose it must be not taking care of only one feature. It should be evaluated all of the features of any online video conference platform and after the overall analysis results, the decision should be given. We hope that the results of this comparative study would help users such as teachers, students, or any person that needs to communicate with anybody else at distance from him or her choose between these platforms and future researchers to know the directions for further research concerning online video conference platforms.

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