

Using Videoconferencing to Augment Blended Learning for Synchronous and Asynchronous Teaching in Educational Emergencies

Alice Njuguna
Zetech University
Nairobi, Kenya

Abstract: The unprecedented onset of COVID-19 and the emergency closure of institutions of Higher learning heralded a new way of completing the curriculum and taking the students through the academic calendar. Previous definitions of emergency education had tried to allude to war, civil strife, floods, drought and even some instances of HIV AIDS or children living on the streets. The COVID - 19 gave a new definition to emergencies, as it led to forced containment and requirement for social distancing on a global level. Prior to the pandemic, Learning Management Systems (LMS) had been around in what would be termed as E-Learning, computer-based education and other computer related terms, Most of the LMS would support both synchronous and asynchronous education. However, face to face learning was still the preferred mode of teaching, and the online component was considered complementary and supplementary. COVID-19 led to Emergency Remote Teaching, and this brought about a change in approach and rethinking of the technologies available for remote teaching. Many Universities had to find a way of providing a supplementary way of providing live and synchronous classes. Previous applications such as ZOOM, Google Meet and Microsoft Teams found their use in the educational setup, with many Universities subscribing to these tools as well as those that are embedded in LMS, such as the BigBlueButton as used to together with MOODLE as a plugin. The aim of this study was to establish how Videoconferencing tools are used to provide synchronous and asynchronous education. The objectives were to establish how Videoconferencing tools are used to aid in teaching and learning, how these tools are used to mirror a face to face class, as well as the challenges faced in integrating these tools in the classroom. This study used a quantitative and qualitative approach where a web-based questionnaire with both open and closed questions were posted to an E-learning special interest groups consisting of faculty in both private and public institutions in Kenya and some students taught by these faculty, and followed by in-depth interviews via Videoconferencing The study established that many institutions turned to stand alone and open source videoconferencing tools to teach both synchronously and asynchronously in a blended mode. The biggest challenge was in the IT element due to non- availability of stable internet connectivity and the fact that neither the students nor the faculty had clear training on the tools available within the videoconferencing applications, and there was no formal method of integrating the same to teaching. The study recommends a policy framework on the integration of such tools in the teaching.

Keywords: Videoconferencing. Blended Learning. Synchronous and Asynchronous teaching. ICT. COVID-19.

1. INTRODUCTION

The traditional classroom has always been visualized as having the teacher address the students in a room where there is face to face interaction. The introduction of ICT in education has seen Information Technology tools introduced to supplement the teaching. Information Communication Technologies (ICT) are increasingly changing both formal and informal education settings, giving students and teachers an enhanced level of synchronous interaction. There are many terms used to describe the use of computers in education, including Computer -Mediated Learning, Computer-Based Education, Computer Enhanced teaching, E-Learning, Online Learning, Virtual Learning, Digital and currently, Blended Learning as the buzzword. All these refer to a situation whereby ICT is used to provide some sort of support in content delivery and assessment, all with the aim of meeting the Learning Outcomes. Today, students and teachers are constantly looking for portable devices such as iPhones, iPads and smartphones. These devices came in handy during COVID- 19 [9] due to their multimedia applications such as audio, video and text capabilities. Many Universities migrated their learners to online teaching via Videoconferencing. Due to the emergency nature of the migration, staff and students were left to use whichever tools worked for them, so long as there was actual teaching, delivery of content, discussions, assessment and even proctoring of examinations [1]. In

Kenya, over 562,000 Kenyans enrolled in tertiary education were migrated to emergency online teaching [3] with varying levels of success. Most of this teaching was via Videoconferencing as some of the Universities did not have mature Learning Management Systems before COVID-19. Even where such existed, there were issues of accessibility.

In cases where videoconferencing has been successful, a learner centred rather than a technology-centred approach wins the day [2]. In addition, institutions should have a clear understanding of videoconferencing tools and their capabilities and usability in teaching before committing to the use of Videoconferencing technology, and therefore the technology readiness of the university in addition to mature pedagogy is important.

Previous studies may not have fully and sufficiently established the challenges posed by the use of different types of Videoconferencing Applications to the Higher Education policy makers. This study thus seeks to establish the videoconferencing tools in use, the challenges posed by these and how these can be addressed to enhance learning outcomes. This study sort to establish the experiences of Kenyan University Faculty students with the use of Videoconferencing during the Emergency Remote Teaching period in 2020 and 2021.

2. LITERATURE REVIEW

2.1 Blended Learning and Constructivism

According to [21] and [23], blended learning is the offshoot of several generations of computer-based learning with the first generation having focused on presenting physical classroom-based instructional content over the Internet. This first-generation e-learning (digitally delivered learning) programs presented a repetition or compilation of online versions of classroom-based courses. The experience gained from the first-generation of e-learning gave rise to the conclusion that no single mode of instructional delivery is able to deliver the interactivity, variety, learning communities, relevance and content delivery demanded in achievement of learning outcomes. In the current wave of ICT in education, an increasing number of instructional designers are experimenting with blended learning models that combine various delivery modes. One of these delivery modes is the blended learning where a number of modes are used to enrich the process [23]. Blended learning is also defined as a combination of internet -based technology and other digital media in the classroom, and it is carried out both synchronously and asynchronously. Videoconferencing can be used to support the synchronous and the asynchronous modes [8].

Blended Learning is a form of partial virtual learning that comes into play in situations where participants are separated by distance [20]. During the Pandemic, Universities turned to the use computer-generated classrooms assisted by online tools to teach learners and facilitate continuation of classes due to the Government's rules and regulations on social distancing when COVID 19 was declared an emergency in March 2020 by the Kenya Government and this led to the emergency closure of Universities. However, faculty and learners would have needed proper training on computer-based instruction before it could be effectively implemented. There was no time for this training.

According to [19], there are four main categories of Blended Learning; These fall under the Spatial perspective and the Cyber perspective. The Spatial perspective considers a situation where all students must attend a physical classroom in either a face to face or a self-paced mode. In the face to face mode, teachers and students interact in a classroom in the traditional mode in a teacher-led synchronous approach, allowing several interactions such as teaching, peer discussions and group work. This is good for the constructivist view of teaching as it encourages interactions, collaboration [10], and communication in the classroom. In the self-paced mode, there is an individual learning process for each student learning by themselves using instruction materials or facilitators in the classroom. This requires adaptive instructions usually supplemented by computer-based solutions which allow students to learn at their own pace. In this mode, terms such as Computer Assisted Instruction, Computer Based Instruction, Web based Learning, Context Aware solutions and other interactive media are usually involved [11]. In the Cyber Perspective characteristics, a classroom in the real-world definition is not available, and the students learn in the cyber-world through the Internet, data communication networks and digital devices in a ubiquitous approach. In the Cyber approach, there is the virtual face to face instruction which fosters interactive teaching without real world distance obstacles [13]. Multimedia tools are used to bridge the distance. There is also the full ubiquitous approach where

students access online resources in a self-paced manner using services such as mobile learning, web-based learning, context aware systems online and E-learning systems and terms such as the flipped classroom and MOOCS are common, and time and space are not an issue. This type of learning is largely asynchronous [22].

The Constructivist Learning Theory was proposed by Lev Vygotsky (1896–1934) and it defined the learning process in social interaction, language, and cultural aspects, concluding that human beings learn best through interaction as a learning technique [24]. According to this theory, learners working collaboratively in interactive group activities can actively construct their own knowledge, which increases engagement and improves the learning outcomes. Most blended modes of teaching endeavor to incorporate collaboration and interactivity in their approach. This constructivist approach to knowledge construction can auger well with the use of videoconferencing using a variety of collaborative learning tasks [18], problem solving, interaction and reflection where distance is an issue.

2.2. Synchronous and Asynchronous Teaching

The last two decades have seen an increase in online teaching [1], but there is a marked shift to blended learning due to the need for interaction and to mirror the traditional classroom. Instructional Designers have turned to blended modes where the use of synchronous and asynchronous methods is used concurrently

Synchronous teaching is a mirror of the traditional class and is normally offered via live links such as live chats and videoconferencing tools that require real-time communication and collaboration as if the participants were in the same place at the same time, providing real time engagement. This is easy to achieve with technology but large class sizes can still pose a problem, and different time zones can compound this further. On the other hand, Asynchronous tools are meant for communication and collaboration over a longer period of time where participants may be in different places and different time zones, through a "different time-different places, allowing them to connect together at their own convenience and schedule [15]. These tools are meant to sustain interaction and collaboration over time using resources and information that are instantly accessible throughout the session.

Distance and Online learning, especially as driven by the COVID19 Pandemic has seen learners having to study without being in a specific place at a specific time, and hence both synchronous and asynchronous tools have become important. These are normally supplemented by quality materials, interactions and activities and instructions that create effective learning. Both the learners and teachers need to know how to use the tools for enhanced achievement of Learning Outcomes. Asynchronous tools can save time the lecture can be recorded and reused as they are built to provide better tools for recording and measuring participation by individuals. Note taking is kept to a minimum as the supplementary material is available digitally [12].

In a good blend, synchronous and asynchronous tools may provide for the posting of interactions in situations where text

and notes would be slower or cumbersome. Asynchronous methods allow shy learners who don't like sharing in public to share their submissions and ease the pressure of interacting in a live session, especially when resources such as internet connectivity and clarity of communication is compromised. Some of these tools allow students to edit their presentations and projects before submitting them, similar to text-based discussions. The main challenge is for faculty to strike the right balance between asynchronous and synchronous modes for different contexts [12]

Using the concept of blended learning, there can be a Blended synchronous educational context which allows remote learners to attend face-to-face classes using of rich-media synchronous technologies such as video or web conferencing. [7]

This approach allows remote learners to sit through a live lecture session, participate in the class discussion and ask question as if they were attending a face to face class, allowing social interaction and support from both peers and teachers. The same class can be recorded and revisited later in a blended asynchronous mode [16]. There now exists a variety of digital tools to provide synchronous and asynchronous learning and these are used to enrich the learning environment by making it more engaging and interactive. These tools provide exactly real-time communication and immediate feedback eliminating anxiety and feeling of segregation that occurred a lot especially during the days of the Pandemic. Such tools include video conferencing applications such as Skype and Zoom. They go ahead and improve social, teacher and cognitive presence as established in the theoretical framework used to understand online interactions supporting teaching and learning is the Community of Inquiry (CoI) model, which consists of three key elements: Social Presence, Cognitive Presence and Teaching Presence [5]. It is the interactions of all three elements of the model that produce the educational experience for participants This is done by establishing new information, rules, research, ideas, and articles that contribute to cognitive presence; instructions, assessment, and class management that contribute to teacher presence; and also emotions, learning communities, self-disclosure, and group cohesion that contribute to social presence as also required in constructivism [17].

2.3. Videoconferencing in Education

Videoconferencing refers to technology that allows real-time transmission and reception of audio and video data over a network between users who can be at any distance from each other [14]. It is also described as technology that allows people living in different locations to hold face-to-face meetings without having to do so in physical space. This can take place between two or more people or groups from different remote locations so long as they have access to cameras, microphone, and speakers, either located on or connected to their computers or other digital devices. Multipoint video conferencing allows three or more participants to sit in a virtual conference room and communicate as if they were sitting directly next to each other [6]. Video conferencing has been used in many corporate meetings especially by multinationals. Some Learning Management Systems have also embedded the use of Videoconferencing (e.g. Google Classroom) while others such as MOODLE allow the use of plugins such as the BigBlueButton, increasing the use of Videoconferencing in Education. The onset of the Pandemic saw the increased use of Videoconferencing in Higher Education. The supportive

nature of Videoconferencing tools offers pedagogical support through file sharing, presentation, and file transfer allowing the creation of external representations of theoretical concepts, evidence, and personal elaborations [4] in collaborative learning.

Common Videoconferencing applications include Skype, which was introduced in 2003, Zoom (introduced in 2011), Google Hangouts, Microsoft Teams and WebEx. These provide video, chat and voice calls through the use of computers, tablets and mobile devices over the Internet to other computers, phones and smartphones. Users can send instant messages, exchange files and images, send video messages, and make conference calls. Features include face-to-face chat, group video conferencing, screen sharing, use of plug-ins, browser ex-tensions, and the ability to record appointments. The features of videoconferencing tools found themselves useful in dealing with the emergency closure of Universities and the resultant demand for social distancing that interfered with the University Calendars.

It is apparent that the constructivist theory of education and the theory of Social Presence require some form of interaction with learners. Blended learning has been able to provide this through synchronous and asynchronous approaches, and Video conferencing provides the much-needed interaction especially in educational emergencies. This study looks at the functionalities that are provided by the Videoconferencing tools and the challenges impeding their full use in Kenyan Institutions of higher Learning.

3. METHODOLOGY

The study was carried out using an online survey with quantitative and qualitative items to 43 Universities in Kenya. These were sent to faculty members belonging to an eLearning Special Interest group. These faculty members were requested to share the survey to one student WhatsApp Group each. The survey was purposefully developed for the study and underwent two rounds of piloting. In the first piloting, four faculty familiar with the context were asked to review the survey and provide comments on its clarity, comprehensiveness and completeness, In the second round, 4 faculty members and four were asked to complete the survey. The researchers analyzed their responses and compared them to the intended purpose of each item. Based on the piloting, some items were revised for clarity and purpose.

The finalized survey included three sections relevant to this study: biographical information; Use of Videoconferencing; and Challenges and Opportunities. There was a total of 23 items. The quantitative items were primarily designed to collect biographical and general information, while the qualitative items were open ended and specifically designed to collect participants' specific use of Video Conferencing tools and the challenges in an explorative manner. The survey was administered to 43 faculty at the end of November 2021. Participants were recruited through convenience sampling from a special interest group and the related students. The link to the survey, which was created via Google Forms, was sent through e-mail, and WhatsApp, an instant messaging service to relevant contacts known to them with an invitation to complete the anonymous survey. The link was active for only 3 weeks. After participants completed the survey, they were requested to self-nominate for follow-up interviews.

The survey dataset consisted of 43 faculty members, 23 who were from private Universities and 20 from Public Universities. There were 256 student participants, of which 67 were from private Universities and 189 from Public Universities. Of the total 299 participants, 53% were male and 47% were female. The second stage of data collection involved follow-up, semi-structured interviews with 12 faculty and 25 students who had completed the survey and expressed interest in participating. The 12 faculty and the 25 students were selected based on their responses in the survey to represent Universities that had turned to Videoconferencing as a mode of teaching after the Emergency Closure of Universities in March 2020. The interviews were conducted through Zoom and lasted between 40 minutes and 1 hour.. They were audio-recorded and transcribed. Ethical approval for the study was provided at the University level with all participants informed of the purpose and procedures of the study.

4.FINDINGS AND DISCUSSIONS

4.1Main Videoconferencing Applications

Of the 299 faculty and students who received the survey, 256 responded. Out of the 256 respondents, 223 had used videoconferencing during the COVID 19 pandemic, representing 87% of the respondents. The faculty and students had used a variety of videoconferencing platforms depending on the University that they came from. However, Zoom and the Big Blue Button seemed to have had University sponsorship, although the respondents indicated that at times they would use different platforms depending on availability and the application that was more accessible. Table 1 below shows the percentage of students and faculty using the different applications. The students were more exploratory with some using other videoconferencing apps such as WhatsApp video calls to communicate and collaborate. All of them had experience of at least three of the platforms. The most common tools and functionalities were the scheduling and timetabling function, the chat box, the share screen, the whiteboard and the breakaway rooms. 92% of the respondents indicated that they would switch off the video function in order to conserve bandwidth, 68% indicated that they would record their sessions for future use. However, synchronous teaching was the main reason for the use of videoconferencing, with 96% of the faculty and 82% of the students indicated that they preferred the live sessions rather than the recorded ones. The asynchronous approaches were used to provide learning activities for after school hours and for discussion forums.

Table 1: Main Video Conferencing Applications

Application	% of Faculty Using	% of Students Using
Zoom	89	83
Google Meet	50	75
MS Teams	72.	69
BigBlueButton	82	76
Skype	6	3

WeBEx	1	1
Others	4	52

From the qualitative interviews, 90% the faculty indicated that their Universities dictated the main Videoconferencing application, with Zoom being the most recommended one. The ZOOM application was either the corporate license with 46% of the faculty while 54% indicated that they used the free to use version that allowed 40 minutes of use. The users of the BiGBlueButton were largely going through the local NREN, KENET, whose services included an embedded video conferencing facility. The students indicated that they used open source software such a Google Meet unless the lecturer indicated a particular preference. Student no 7 said “our lecturers normally allow us to log into the lecture through YouTube” while student no. 25 said “I would normally attend the live lecture via Facebook as our class was too big for Zoom licenses subscribed to by the University.”.

4.2. Planning, Scheduling and Class Management

One of the main uses of the Videoconferencing Applications was planning, scheduling and class management as shown in Table 2. Below. Although many students indicated that their universities have Student Management systems and ERPs, these were found to be inaccessible during the lockdown due to network issues.

Table 2: Videoconferencing Uses in Planning, Scheduling and Class Management

Function	Description	Uses
Start a meeting	Create a videoconference.	Planning and Initiating classes
Schedule a meeting	Allows you to schedule a specific day and time for the meeting and manage the calendar	Scheduling classes
User management	You have the option to enable and disable the audio and video of the participants, as well as manage which user enters the meeting. The host can mute, set or delete a user.	Class management and attendance monitoring
Invite other users to join a meeting	Gives you a meeting link or code that you can send to other users.	Class management, collaboration and attendance monitoring

Multi-platform	Phone, pc, laptops, tablets so long as the device has audio and video functionality	Flexibility and accessibility
Time limit	Some platforms can run for 40 minutes to 24 hours depending on license terms	Scheduling
Settings	Shows other options available to the application, such as: audio distribution, screen appearance, etc that allows for online proctoring of examinations	Class management
Leave	By pressing that option, the member can exit the live class	Attendance monitoring and class management

The faculty indicated that they would schedule a class on the Videoconferencing application and then send a link via WhatsApp or Email. The students would then follow the link and join the class.

Many of the application allowed the lecturer to manage attendance, including having a waiting room that allowed them to vet participants and setting the duration of the lecture. The students were happy with the multi-platform ability of these applications and especially ZOOM that allowed them to use even the simplest Internet Enabled phone. Student no 7 said that “I could catch up with the lecturer using my earphones as I travelled or did other things around the house, or record the class and listen in later”. Lecturer no 16 said that the Videoconferencing applications allowed better class management as “ I was able to monitor dormant learners and also mute the disruptive ones, and this brought discipline to my class”

4.3. Collaboration

The lockdown period and the resultant requirements for social distancing and restricted movement meant that the learners could not attend a physical class, reducing the much-needed collaboration and interaction even further. The faculty and the students turned to videoconferencing to improve this. The chat, screen sharing, virtual whiteboards and breakaway rooms provided synchronous and asynchronous ways of communicating and collaborating, allowing participants to stay in chat in multimedia modes including text, voice, video and graphics as shown in Table 3 below.

Table 3: Videoconferencing Uses for Collaboration

Function	Description	Uses
Screen sharing	Allows all participants to have the option to choose what to share with other meeting participants. Allows you to show your screen or the window of an application.	Collaboration and presentation
Virtual whiteboard	Allows you to draw, write or carry out explanations in an easier way.	Collaboration and presentation
Chat	Participants have the option to interact both directly and privately. Users can interact by sharing files and views.	Collaboration
Invite other users to join a meeting	Gives you a meeting link or code that you can send to other users.	Class management, collaboration and attendance monitoring
Breakaway sessions	Allows the lecturer to divide students into smaller discussion groups	collaboration
Reactions and Polling	Interaction of members, such as: raising your hand to give your opinion, then the host will respond to your request.	Collaboration, interactivity and assessment

Student no 1 stated that “ I could talk to my classmates or the teacher in a private chat if I needed clarification confidentially” while teacher no 9 said “Teaching mathematics was even easier as I could write formulae on the virtual whiteboard or enable my learners to draw a graph or demonstrate a concept on the same platform”. The screen sharing tool allowed the collaborative editing or analysis of a problem and the learners felt that this removed the social isolation normally found in virtual learning.

4.4. Actual Teaching and Delivery

90 % of the lecturers indicated that they ensured that each session had a live lecture period to articulate the concepts and students were expected to attend, listen, take notes, ask and answer questions, do short quizzes, share their findings and experiences just as they would do in a normal face to face class. They allowed simultaneous and concurrent chats in the class and used functions such as the raised hand to elicit reactions to the learners. 100% of the students found this functionality very useful, and they would ask for a recording of the class to review the concepts later. Table 4. The polling function allowed the faculty to assess learning and concentration of the learners.

Table 4: Videoconferencing Tools in Actual Teaching and Delivery

Function	Description	Uses
Live Conference	Audio and Video Conference on the App and broadcast to Facebook and YouTube	Live Lecture
Screen sharing	Allows all participants to have the option to choose what to share with other meeting participants. Allows you to show your screen or the window of an application.	Collaboration and presentation
Virtual whiteboard	Allows you to draw, write or carry out explanations in an easier way.	Collaboration and presentation
Chat	Participants have the option to interact both directly and privately. Users can interact by sharing files and views.	Collaboration
Breakaway sessions	Allows the lecturer to divide students into smaller discussion groups	collaboration
Screen Recording	Allows you to record the sessions so that the student has all the information at hand. If in case the students want to listen to the class again	Asynchronous teaching and content management
Leave	By pressing that option, the member can exit the live class	Attendance monitoring and class management
Reactions and Polling	Interaction of members, such as: raising your hand to give your opinion, then the host will respond to your request.	Collaboration, interactivity and assessment

The virtual whiteboard and the screen share function allowed the usage of PowerPoint and other presentation Software, and lecturer 11 said "I found the Videoconferencing application to be very effective and I plan to continue using it in the future, especially when embedded to the Learning Management System". Student no. 5 said that "the breakaway rooms allowed me to discuss concepts with a smaller team which made it easier for us to break down content with likeminded individuals".

4.5. Proctoring and Other Uses

60% faculty indicated that they used live videoconferencing links to proctor exams. This required the student to log into the exam session and share their screen and also leave their video on to allow the lecturer to monitor activities. The learners indicated that the videoconferencing apps allowed them to build communities of learning, but to also do joint projects and papers, and also for social interaction beyond the normal classroom reaction. The faculty used video conferencing to give both synchronous and asynchronous feedback. Lecturer 10 said "I would record the answers to discussion questions and send them to the learners". One lecturer who teaches tourism said "I would provide a virtual tour of a pack via videoconferencing to keep my class captivated"

4.6. Challenges of Videoconferencing

While all the participants agreed that Videoconferencing had come to the rescue during the lockdown, a number of challenges cropped up which made it difficult to achieve the learning outcomes.

4.6.1 Students

The students were originally ill prepared for videoconferencing. They found it difficult to concentrate and would get Videoconferencing "fatigue" just sitting and watching a screen. Some of the students had had no prior experience with E-learning and had just joined the University in January 2020. They found themselves in foreign territory having to maneuver a class in virtual space without formal training. Although they had used some of these functionalities for entertainment and social purposes, adapting to educational use posed a challenge.

4.6.2 Content

Although there exist varying ways of delivering content such as a live oral lecture, PowerPoint slides, screensharing and virtual whiteboard, some content required a more physical feel and smell as well as 3-D presentations. Lecturer no 9 said "I teach hospitality and apart from color, food smell and aroma are important elements and these are still difficult to illustrate or demonstrate virtually, even with simulation software. Student no 24 said "there were practical classes that would normally take place in an actual lab and were unable to do these at home as we could not set up the experiments"

4.6.3 Pedagogy

The students were particularly perturbed by faculty who were not able to teach well online. "the lecture just came with the notes, shared the screen and continued to read through, so we could just log in and disappear to wait for the recording", said student no 16. This indicated a lack of training on online pedagogy on the part of the lecturer, which affected collaboration and interactivity. Just like the students, there were faculty who were encountering online learning for the very first time and they were not exposed to managing the class or delivering content via a technology intervention.

4.6.4 Information Technology

This dimension elicited the most challenges as elucidated from this study. Perhaps due to emergency nature of the migration, most respondents felt that there was lack of consensus on the application to use, and different lecturers and students would turn to whatever was available and familiar to them.

Technical challenges included poor connectivity especially when student and faculty were logging in from remote areas or buildings with poor low bandwidth. This resulted in poor sound and intermittent and rainy graphics, coupled with the high cost of the bandwidth, the respondents indicated that more often than not, they would turn off their video and also limit the live conference to a shorter period of less than 30 minutes, thus affecting the duration of the lecture, the quality of learning and syllabus coverage.

Some of the video conferencing applications had low compatibility with devices. Some users only had access to desktops with no video capabilities, and buying a camera was the only option, which also came with issues of compatibility. Others had phones with very small screens that were not conducive for interacting with huge amounts of text, thus affecting legibility even where there was screen sharing and virtual whiteboards.

Security of the applications was also an issue as some learners would share the links or hackers could access classes thus compromising the security of the learning experiences.

78% of the respondents indicated that they observed lack of a proper integration framework and some faculty would send links via the Learning Management Systems or other messaging services such as WhatsApp and SMS. This led to discrepancies in the use of the applications such as when using the applications for proctoring or for breakaway sessions or in attendance monitoring.

4. CONCLUSIONS

The study established that many Universities in Kenya turned to Videoconferencing to cope with the impact of the COVID 19 emergency. The main tools used were ZOOM and the big Blue Button, and both faculty and students found the tools available to be sufficient to mirror a face to face to face classroom. The major benefit was the flexibility, interactivity and the collaboration afforded by these applications. However, there were challenges emanating from the Students, the Content, the Pedagogy and the Information Technology, with the IT presenting the biggest challenge due to the technical nature of videoconferencing. The lack of a framework on how to integrate the Videoconferencing tools with the blended teaching compounded the problem. Such a framework would outline what is required of the students in terms of training and the devices to acquire. There would be a description of how to handle varying content over videoconferencing. A guideline on how to train the faculty and which approaches to use for both synchronous and asynchronous pedagogy as well as how to structure a class to be delivered via videoconferencing, handle questions, discussions and breakaway sessions on the part of the lecturer would be helpful. Finally, the ICT matters, and especially the actual videoconferencing application to use, how to integrate it with the Learning Management System and the ERP as well as the question of actual devices and compatibility should be addressed in the framework.

This study was carried out with the effects of COVID 19 still in mind, and it would be good to carry out a study to establish whether such frameworks have or are being developed post COVID as it is apparent that Videoconferencing is an application that many Universities would like to continue using.

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