

Teaching virtually using multiple application to overcome digital divide during the COVID-19 pandemic

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Abstract

The COVID-19 worldwide pandemic affected extensively educational institutions that relied on traditional face-to-face teaching strategies. The current context of South African higher education institutions are still battling with historical inequalities. The study explored the students' multiple platform experiences of participating students during the COVID-19 pandemic. The article reports the use of multiple applications to circumvent digital divide and help accommodate students who were not able to access the conventional video conference. Using a qualitative exploratory research method, the study used the Universal Design for Learning framework to guide the synchronous use of multiple applications. 165 pre-service teachers participated in the online learning. Pre- and post-study Google form surveys was sent to all participating pre-service teachers. Conversation analysis was used to study the participants interaction. The results indicated that using multiple online platforms reduced the online learning barriers caused by connectivity challenges and lack of technology tools and resources. Pre-service teachers revealed that they were able to attend classes and that mp3 and mp4 lecture recording, WhatsApp discussion and revisiting the radio showreel made it easy to comprehend content. The researchers recommend educators to explore digital tools that students have and are comfortable to work bearing in mind the diverse background of students.

Keywords: COVID-19, Blackboard Collaborate, WhatsApp, Microsoft Teams, Online Radio, Universal Design for Learning, Higher Education, Inclusiveness, Equity

Introduction

The pandemic crisis presented the greatest opportunity for higher education to take up the challenge of increasing technology-mediated teaching strategies that help reduce digital - divide. A well-constructed digital bridge for the future must be inclusive. This paper reports on the researchers' synchronously using different platforms during the COVID-19 pandemic lockdown in teaching and learning at a teacher training institution. The researchers used WhatsApp, Microsoft Teams, Blackboard collaborate and an online radio channel application during her contact live sessions. This strategy allowed students to join live class sessions through a platform that works for them which enabled them to join the live class sessions. The closure of institutions due to COVID-19 pandemic meant that traditional face-to-face (F2F) learning was disrupted. Given the abruptness of the circumstances, educators and administrators were unprepared for this transition and were forced to improvise an emergency remote learning system. In Higher Education institutions (HEI), learning management systems were in place, however they were often used to support F2F teaching strategies. Studies indicate the pandemic gave rise to learning losses (Mhlanga & Moloi, 2020; Martín et al., 2021), increased inequality (Marioni et al., 2020) and eventually impacting

national economies. Learning losses are predicted to translate to greater long-term challenges. The absence of any sound innovation spells disaster with negative effect on students' future well-being.

To mitigate the challenges unveiled by the covid-19 pandemic, required the HEI to build more resilient strategies that could endure imminent catastrophe events. At the core of these mitigations is to empower educators with digital mediated teaching platforms and resources, however, most HEIs were slow to adapt to the virtual learning environment. Educators were left to blindly explore and navigate the new digital environments (Chirinda et al., 2021). Some formed communities of practice to set up supportive remote learning experiences, i.e., departments or subject groups to share and help each other. Students were encouraged to stay active in social media and online platforms supported by the institution for learning purposes (Emmanuel, 2020).

The researchers noted with concern that the virtual class attendance was low and students complained of connectivity and lack of appropriate devices such as laptops or desktops and smartphones. In one academic class that had an enrollment of 160 students will always have 50 – 60 attendances, in most cases the same students. Attendance is an important measure of educational quality and a predictor of student success. The researchers realized that not all students had access to the required minimal basic digital tools such as high-end smartphones, laptops or personal computers, and importantly reliable internet access to help access course content and engage students. As a result, educators continuously looked for ways to reach these students and enhance learning. As indicated earlier, COVID-19 physically separated educators and students leading to a psychological space resulted in the digital divide currently experienced in education. In an online environment, educators should support student autonomy and inspire online students to be part of a larger community through nurturing a communicative learning culture. Indirectly encourage students to stay active in social media groups and online discussions Mlotshwa et al., (2020), invite them to leave comments on the eLearning forums

In this study, digital tools for teaching and learning include hardware devices (e.g., laptops, mobile devices), software (e.g., applications), and technology-based environments (e.g., websites, learning management systems (LMS)). Most features of online learning align very well with UDL principles, enhancing multiple means of representation, action, expression and engagement. The use of digital tools can help educators to easily represent information in diverse formats (e.g., combining text, visuals, audio) and integrate features that allow the students to choose how to consume information using which digital tools. Technology-based environments can also be engaging, allowing educators to provide authentic and relevant learning opportunities for interaction and collaboration. In these ways, online learning environments that inherently require the use of digital tools as a means for delivery and instruction present many opportunities for incorporating and applying UDL (Rao, 2021).

Universal Design for Learning online framework

Universal Design for Learning (UDL) is a framework that guides developing inclusive online learning instructional design processes (CAST, 2011). The UDL for online learning was used to

guide the researcher on the planning process for inclusive online learning. UDL consists of three principles namely; multiple means to representation, action & expression and engagement. Each of these principles has three guidelines that define how educators can provide options and support in designing online learning. The UDL framework provides a structure to proactively design lessons that integrate inclusive instructional strategies and options that supports students (CAST, 2011). The UDL three principles;

1. Firstly, consider learner variability and reducing barriers in instruction as part instructional design.
2. Secondly, design learning experiences for online lesson delivery, bearing in mind the use of synchronous/asynchronous methods, integrating digital instructional tools.
3. Finally, articulate how UDL is applied to the design and implementation of lessons and related student outcomes.

According to UDL researchers, emphasize that technology integration in teaching and learning is not one size fits all, students have varied strengths, experiences and preferences that could be dynamic depending on student's context and preferences.

Recognizing and addressing learner variability

According to principle one of the UDL, learner variability is inescapable in learning concepts. In other words, learners have varied abilities, strengths, experiences and preferences, these aspects can be dynamic and changing according to their context and development (Chirinda et al., 2021). Educators' abilities to accommodate this truth by harnessing each learner in their teaching strategies is of paramount importance. Taking learner variability into account, the process of planning instruction in alignment with UDL guidelines allows educators to consider and integrate flexible and supportive options that are helpful for all learners from the outset. UDL-based instruction can make existing educational practices more inclusive, by integrating technology that supports a wider range of students.

Developing expert learners

One essential goal of UDL is to support the development of a self-awareness allowing students to become expert lifelong learners in their personal development mastering journeys.

1. Being purposeful and motivated (engagement) -: learners' abilities to be goal-directed, sustain effort, and self-regulate as they learn.
2. Being resourceful and knowledgeable (representation)-: learners' abilities to activate and connect to prior knowledge, recognize strategies to structure and retain knowledge, and transfer and generalize what they learn
3. Being strategic and goal-directed (action & expression) -: learners' abilities to plan and organize how they learn, be strategic learners, and self-monitor as they learn (Rao, 2021).

They formulate the fundamental concepts of inclusive online instructional design.

Applying UDL for online teaching and learning

The COVID-19 pandemic has made educators make a rapid shift to online learning. The shift challenged educators to design inclusive instruction for online learning environments. Digital

tools and multimodal formats that are used for online teaching and learning provide many ways to deploy UDL. In order to address learner variability in the emergent remote learning environment, the researchers explored each level in the UDL design cycle with the intent of creating an inclusive remote learning experience.

Table 1: UDL for online learning

UDL design cycle	UDL based on Online environment	Factors considered
Student variability	Student online environment - how students engage and learn online.	- Connectivity, - devices, - application
Identify learning goals	- Interaction - content sharing & comprehension	- Synchronous and asynchronous lesson engagement
Develop assessment	Types of assessment - Formative - Summative	- Discussion forums - Team collaborative activities - Quizzes and online assessment tools
Develop methods and material	Use instructional strategies that address learner variability	- Identify digital tools along with instructional strategies that reduce barriers, addressing student's strengths, preferences and needs.

The Table 1 above shows the UDL online learning design cycle, each level has factors that need to be considered in response to UDL design principles.

The researcher deployed the UDL design cycle by exploring student variability, how do students currently engage and learn virtually? Understanding student variability helps educators review factors such as types of connectivity, devices and software they are using.

WhatsApp

COVID-19 pandemic forced students to their homes, whilst institutions embarked on online learning using institutional learning management systems. Unfortunately, not all students could access learning management systems, due to either poor internet speed, lack of data or inconsistent electricity. WhatsApp has over one billion active subscribers, with the majority of users being the younger population (WhatsApp, 2021). WhatsApp is widely used due to its user friendliness, cost effectiveness and efficiency. Furthermore, WhatsApp has relevant features that teachers and students can use, such as group, invitation links, mute members from posting, administrator roles, and audio and video creation and sharing content in any format (WhatsApp, 2021). Therefore, it makes a lot of sense to implement it to deliver virtual learning. Interestingly, most WhatsApp features work well even in resource constrained environments. Although WhatsApp is designed for social engagement, it has benefits to help

educators engage and share text, audio and video content with students, even conduct classes. With a WhatsApp bundle, messages can be downloaded at once and can be read whilst offline. Students can set when to download videos and images (WhatsApp, 2021). The group feature enables users to create learning and study groups. Therefore, educators can take advantage of the scalability of this social media application for educational purposes. Researchers have explored the viability of WhatsApp platform in teaching and learning to increase interaction (Tunjera, 2014) to share resources as an instructional tool in blended learning. The COVID-19 pandemic revolutionized the way educators view technology. Educators can deliver lessons using WhatsApp and assess using the edit feature, and give feedback to individual students.

Blackboard and Microsoft Teams

Blackboard is a web-based Learning Management System that's used to help students improve their learning experience. It's easily customized to an institution's needs. Students can use Blackboard to complete online tests and assignments. Some exciting engagement tools include discussion forums, online group work forums, blogs and journals (Chen et al., 2020).

Microsoft Teams (MS Teams) is another virtual learning application developed by Microsoft. MS Teams meetings can now be integrated within Blackboard! You can create meetings and share them with students all from within Blackboard. MS Teams is a persistent chat-based collaboration platform complete with document sharing, online meetings, and many more extremely useful features for business communications (Rojabi, 2020). Microsoft Teams is free, it offers unlimited chats, audio and video calls, and 10GB of file storage for your entire team, plus 2GB of personal storage for each individual.

The researchers scheduled virtual meetings following the faculty timetable on which both MS Teams and Blackboard collaborate under the course code, henceforth registered students automatically receive notification of the schedule. Students chose platforms that were not restricted, what was comfortable was what they would connect with.

Internet radio channel

An internet radio channel is a radio program that offers listeners a broadcast service using world wide web infrastructure instead of using radio frequencies (mixrl.com, 2021). Listeners can listen to this service online via a live stream, using a computer or smartphone (Mbagwu et al., 2017; Ume, 2016). Internet radio has no geographical barriers and an Internet radio broadcast can be accompanied by photos or graphics, text and links, as well as interactivity, such as message boards and chats (mixlr.com, 2021). Listeners are required to download the online radio application on their mobile device or desktop and register and create their profile. As registered users they have access to all broadcasts under the radio channel. However, to receive notification on live broadcasts the listener is expected to follow their desired broadcasts. However, the broadcaster can send their radio channel link to targeted listeners who can use the link to follow the broadcast channel.

As a supplement of F2F and limited connectivity, radio possibilities are limitless for education (Vryzas et al., 2020). Online radio stores broadcasts in a show reel to listen to after the sessions. Online radio broadcasting has the advantages, students can listen to the lecturer as if they are in a physical place. Using the chat feature students are able to discuss, raise issues or ask questions on real time as the broadcast is live. Another advantage of online radio broadcasts, it is highly economical and can reach a larger audience. Despite the affordances, the radio has some limitations, the major one being teacher-oriented teaching style, hence students have limited opportunity to participate (Mbagwu et al., 2017). However, in this study, the researchers share a PowerPoint with the course content for the next day's virtual class session. This implies that before the virtual online session, students had already had what the virtual class session will be covering. Students would have accessed the content hence the virtual class session will be for in-depth content engagement with questions, discussions and reflective engagements. Even those on radio would post questions and respond to others either on the radio chat or on WhatsApp using a voice recorder.

Methodology

The study explored the use of synchronous and asynchronous multiple platforms during the COVID-19 pandemic online teaching and learning for inclusiveness. The study used a qualitative methodology following an interpretive research approach. This descriptive research involves direct exploration, analysis and description of the particular phenomena. Descriptive studies are used to document the phenomenon of interest in the real situation. This means that the case's reality is studied and interpreted within its social context (Yin, 2013). This afforded the researchers an in-depth understanding of how the multiple platform engagements can be employed to enhance inclusiveness in digitally enhanced learning.

One principle of selecting a single case study is that it provides an appropriate context (Bryman, 2016); 'How technology enhanced learning strategies were used to realise equity and inclusiveness during COVID-19 pandemic?' The study explored the students' multiple platform experiences of participating students during the COVID-19 pandemic. The experiences of students during their ICTs in Education online learning are described and recommendations for inclusiveness in digital enhanced teaching and learning.

Pre-survey link was shared with all professional studies students, in line with UDL learner variability, the survey sought to explore students' technological resources they had access and were capable of using during the online class sessions. A post survey link was shared with the students at the end of the course. to reflect and give feedback to their experiences on using multiple platforms throughout the course. The researchers furthermore used virtual interactions, class recording, comments from the platforms and students course evaluation feedback forms to gather data for the study. The researchers took an observational role to allow students to independently engage without being interjected. Students' interactions, comments, video and audio recordings and class feedback were the data collection instruments used in this study. The four platforms used; WhatsApp, BlackBoard Collaborate, Microsoft Teams and online radio gives students ability to comment and interact with each other pertaining to raised issues. The researchers used trace analysis to gain insights in

participants' use of the different virtual platforms. In order to understand students' active participation in the virtual platforms, tracked attendance was used to monitor students' levels of engagements.

The data was scrutinized looking for metaphors, topical transitions, and keywords to help identify emerging themes. The researchers familiarized themselves with thereby realizing codes and searched for patterns or themes across all data instruments. The following section is going to explain how students were enrolled in each application deployed in this study.

Enrolling students to all the platforms

For students to be part of a group they have to enrolled into the course and given access to the platforms either by a shared link or being enrolled as a student into the platforms. However, for WhatsApp and Radio, links inviting them to join were shared in BlackBoard announcement and the class representatives also shared with others in their other social networks.

BlackBoard LMS and MS Teams

All students registered for the course were automatically linked to their respective registered modules, giving them access to BlackBoard LMS and MS Teams. Module facilitators can make announcement that every enrolled student receives. Furthermore, facilitators can create content upload content in text, audio or video formats, create assessments; mark online and generating a marks gradebook. However, these platforms work better with some smartphones, not with others.

WhatsApp groups

The WhatsApp group feature accommodates up to 256 participants. (Gachago et al., 2017; Rojabi, 2020) have shown the positive impact on small groups of students as they work together to achieve a learning goal. A group of ten participants were allocated a group identity and a leader was appointed. The group leader then created a WhatsApp group platform link and shared with members who joined the group voluntarily. To control the group, only administrators of the group were allowed to post and set a time when all group members could post. If one could not wait for scheduled time, members' questions and answers were given limited time and days depending on class activities set. Anytime posts were passed directly to the class representative who would pass on to the group platform as seen fit. Lecturer communications, notes, audio and links to websites resources were also shared in the group WhatsApp platform.

Online radio channel

The researchers further registered and paid monthly subscription that offers daily 3 hours live broadcast, scheduled broadcast sessions for class meetings. The class online radio was given a unique link address, which class members would use to join the radio sessions. Students had to download the online radio app or use the web browser and follow the given class radio broadcast. It is important to note that students chose the platform that worked for them.

If one link fails then they had an option to try another platform. The online radio channel allowed students to join the class sessions and could hear all the engagement, however they could not see teams or blackboard videos until they were shared. Radio broadcasting has been used to reach communities that could have been isolated, and could reach a large number of audiences.

Pre-survey and post-survey

As highlighted earlier the pre and post surveys were used to explore students' variability in terms of their online environments and technology readily accessible to them and finally their experience on multiple platform strategies used. After a survey which sought to explore the variability of technological resources. The survey responses revealed the wide range of devices were disproportionately distributed. Remarkably, all students responded to have access to social media WhatsApp 24/7. 54% had access to Teams and 58% had access to teams and Blackboard respectively. 9% mentioned they had access to Zoom or Skype. All 165 had access to a smartphone, 35% had access to laptops and 9% had access to desktop computers. See Figure 1 and Figure 2 below.

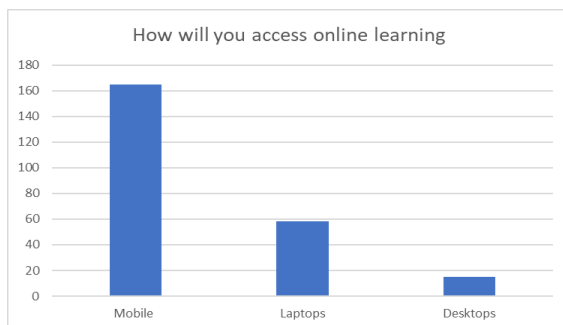


Figure 1: Devices used to access online classes

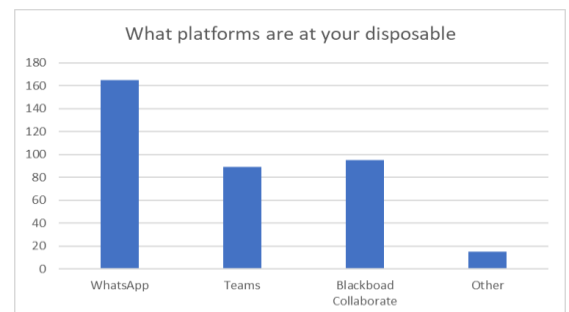


Figure 2: Platforms available to students

Figures 1 and Figure 2, shows the types of digital technological tools for remote learning that students had access to. The researchers, after realizing the variability of the students, explored technological affordance by linking multiple devices synchronously.

Streaming across platforms

The move to online virtual conferencing is hailed as positive steps for continuity in learning. However, this is no guarantee that every student can attend, has resources and skills to attend. Researchers raised concerns about inaccessible barriers to some students and communities (Daniela et al., 2018; Oakley, 2017). Streaming across platforms in this study refers to simultaneously broadcasting to more than one platform. Streaming to multiple platforms ensures that you reach across a greater audience (Duan, 2020). In this study, the researchers did not use a streaming application, but used what was available to them within their knowledge capability, they shared the computer sound.

While acknowledging the benefits of online virtual learning platforms, the researchers explored how they could stream the virtual class session across platforms accessible to all

students. They logged in all four platforms, WhatsApp desktop, Blackboard collaborate, MS Teams and the online radio. The researchers used dual extended screens see figure below.

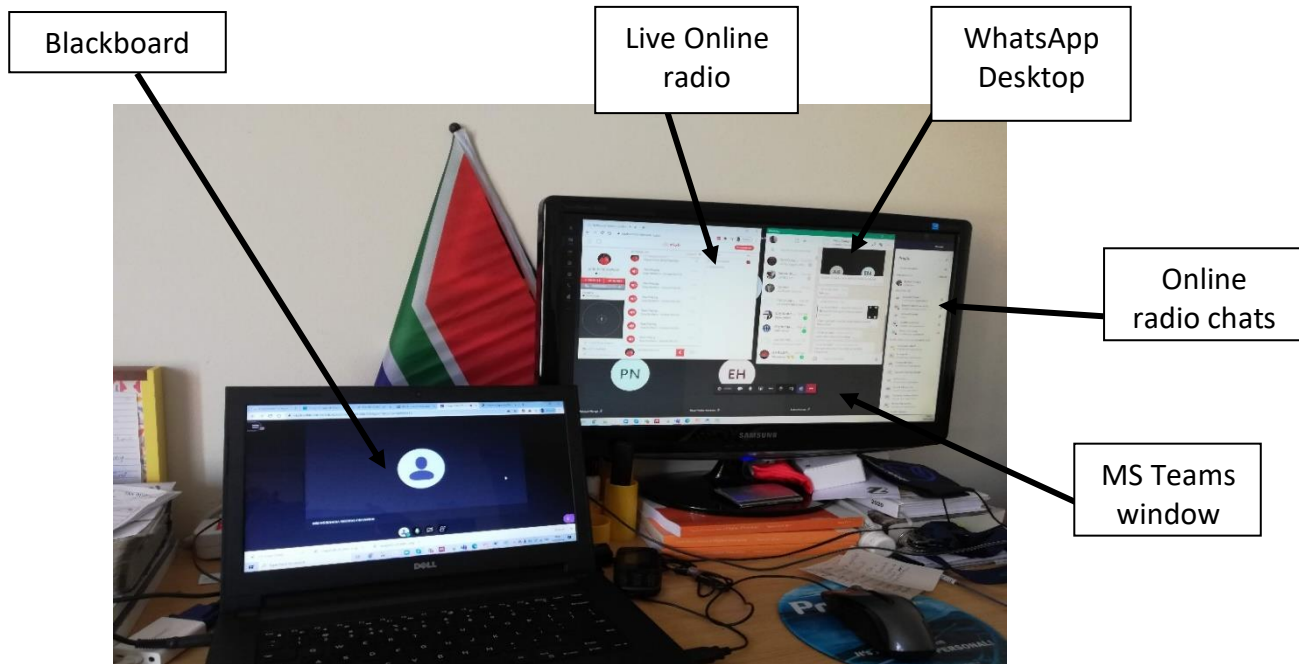


Figure 3: Showing the four applications running synchronously

The above Figure 3 reveals the live class session using all the four platforms synchronously. The pictures were taken when the lecture was starting.

The setup revealed inclusiveness of multiple synchronous use of platforms that students had access to. As mentioned earlier course content would have been sent to the students prior to the scheduled class time. The researcher used headphones to avoid echoes of sound, see below Figure 4

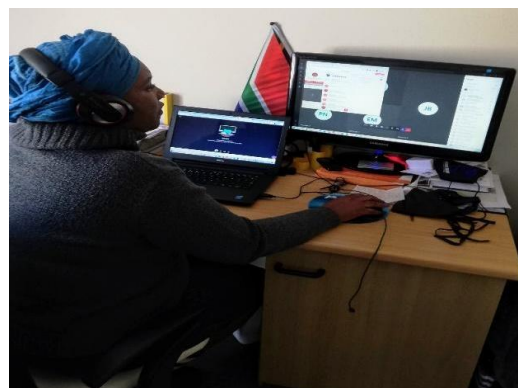


Figure 4 Researcher's setup with headphone to reduce echoes

The students who were connected to the Virtual online class using Teams or Blackboard directly could see the presentation directly, and those connected through the radio could listen to the discussions. One volunteer used their WhatsApp to record and share audio recording on WhatsApp. At the end of the session the Teams or Blackboard Collaborate was

shared with all as both video and audio formats. The setting up with practice one gets used, it will no longer be that challenging.

The table 3 below illustrates the affordances of each of the platforms and what they offered to help increase inclusiveness in remote learning.

Table 2: Four platforms uses and affordance

Platform	Interaction / engagement	Chat section	Video / audio	Synchronous / asynchronous	Instructor presence	Data usage
BlackBoard Collaborate	Yes	Yes	Both	Synchronous	Moderator	20kbps – 300kbps
MS Teams	Yes	Yes	Both	Synchronous	Organizer	225mb/h
Mixlr online radio	Yes, but Minimal	Yes	Audio	Asynchronous	Broadcaster	60mb/h
WhatsApp	Yes	Yes	Text/ audio/ video (calling only)	Synchronous Asynchronous	Silent or active	Depend activities (weekly/monthly bundles)

The Table 2 gives a comparison of the four platforms used in this study. At what level each platform interaction or engagement takes place, if it has a chat, video or audio feature. Whether it gives users synchronous or asynchronous engagements, the role the educator, as well as the level of data usage. This analysis helps users to understand the affordances of each application being used.

Findings and Discussion

In this section, the emerging themes from the data are presented and discussed. The feedback from which students used to evaluate the module, indicated that the use of multiple platforms allowed them to choose which platform to use for what session. The researchers deployed and used all the four platforms during the online class sessions to help learners to overcome issues to do with connectivity and lack of appropriate digital devices that were limited with some platforms.

Choose a platform that works for them

Participants indicated that prescribed virtual tools were a challenge considering that remote learning at home had many challenges due to availability of network and also was using a mobile device that experienced network reception challenges. Given the different platforms to access classes, students indicated that they were able to connect unlike previously when they waited for hardcopy notes.

I downloaded the Mixlr radio app and joined the class using the channel ,though it was audio I could listen to the class session remotely following through the PowerPoint shared...

The above participant mentioned that they are in the rural area and due to connectivity issues Teams and Blackboard collaborate were not accessible.

I was frustrated trying to join classes on MS Teams or Blackboard because it never worked for me. I relied on WhatsApp group communications, although it was difficult as I was behind in most class sessions... I would always have to ask others to explain stuff...

The above sentiment indicates the frustration and anxiety students faced especially if they were not able to join virtual sessions. They opted to use an alternative platform available to them, they were able to follow up on class sessions. However, they had to rely on others on what was covered in class. On the other hand, a student appreciated the sharing of class PowerPoint presentations in WhatsApp.

...the lecturer posted PowerPoints on Blackboard and the WhatsApp group prior to the sessions prepared me for the class better even though I had connectivity challenges ... always the case in our area as my mobile service provider is not that efficient. I knew what content will be covered...

The above comment reveals that providing students with content before the sessions helps students at least flow with others despite connectivity issues. Students indicated that having the content reduces anxiety and depression on the part of the students. The concept of flipped classroom model gives students autonomy to read at home and increase engagement during the face-to-face virtual meeting (Strecker, Kundisch, Lehner, Leimeister, & Schubert, 2018; Schleicher, 2014). In this case every student had access to shared PowerPoint content across the platform, in meetings reflections and critical engagement were conducted. However, critics refute this and posit that students will not attend class intentionally (Sahrir et al., 2012). On the other hand, proponents argue attending classes increases as students get engaged and actively participate in online class (Johnson et al., 2014). Notably, the platforms used in this study, students are encouraged to respond to questions using audio or chats, this could also be used as contributing towards formative assessments.

Follow up on class recording

The students also revealed that given the multiple platforms, they were able to listen to the recordings in different formats such as mp3 that works more on most mobile phones. The MS Teams and BlackBoard collaborative video recording links were also shared on the WhatsApp group.

One student reported that the shared links made their learning enjoyable, even though they were not able to attend classes due to network reception issues.

I was able to follow up on class sessions off pick hours as my internet reception improved at night, I would download all recordings then listen offline. This made me catch-up with others and was able to complete my assignments and tests.

Class recordings were mentioned to give peace of mind, despite not actively attending classes due to connectivity challenges. According to research lesson recording helps students to easily access content anytime which gives them catch up time so they do not lag behind (Bhalla, 2013; Bates, 2015). During this pandemic a lot of students missed classes due to illness or death in the family. They could catch up on what they had missed.

I contracted COVID-19 and was hospitalized, I was able to go to the recording whilst I was in hospital to catch and also when I got discharged, it helps me not miss anything learned

However, concerns of students intentionally choosing not to attend class (Asmara, 2020), henceforth pointed to high class absenteeism, if not followed can lead to high dropout rates. In a study, Topale (2016) suggests educators harness the power of technology to help increase attendance, such as using student centred strategies that increase active participation, impromptu calling students' names, breakout rooms which gives participants the ability to work and interact as peers.

Convenience and flexibility

The students indicated that using the multiple platforms gave them flexibility of making choices and using the platform that was convenient to them. Students agreed they were satisfied with the flexibility offered during online learning, especially on assessments as the sessions remained open for longer than one-hour physical tests and also the increased number of attempts given made it more flexible to cater for those with connectivity issues. In their study, Cole and Weber (2019) reported that resources such as recorded video instruction, online activities, and assignments can be downloaded or accessed online thereby providing shared access to devices in households.

This class was a relief to me specially, I downloaded the radio app and Teams, I used them both. In some cases, Teams gave me problems, I would quickly login to the radio. This was one great thing... WhatsApp helped me to think and ask questions with others...

The above student indicated the flexibility and convenience of having to choose from multiple platforms. Each platform has its own challenges and benefits, analytics of each platform helps the educator to observe which platforms are more popular and make the most impact on students.

All the platforms used in this study can be set to automatically record sessions, therefore this saves time on the part of the educator as they do not need to upload recordings. Students can directly and easily access the recorded content anytime.

Multiple media Instruction strategies

The majority of students complimented and commended the researchers on using a variety of platforms which students had access to, and their convenience and flexibility of teaching and learning during the unprecedented times. Overall, the students agreed that using the multiple virtual platforms was valuable to them, though the purely online learning mode of classes was their first experience during the COVID-19 pandemic. However, on the part of the

researchers the planning and skill to synchronously work with the four platforms, requires planning and time management.

Conclusion and recommendation

The purpose of this study was to explore the synchronous use of multiple platforms to support students learning during COVID-19. This study helped to show the usability of different platforms. As indicated by the students, using multiple platforms will increase students virtual class participation and student-student, student-lecturer, student to content engagement. It is crucial to observe that COVID-19 pandemic raised the need for inclusiveness in the virtual learning environment. Streaming class sessions across platforms is used in social sectors, using them for teaching and learning ensures that no students would be left behind. The researchers recommend that educators should find ways of accommodating all learning through exploring what students have, in order to reach them using the platforms accessible to them. The use of multi-platform lecture engagement should be explored further using streaming applications, entailing educators need to be innovative as these promises to reduce the digital divide and increase inclusiveness.

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