

Educators Synchronously Using Multiple Platforms and Devices for Teaching and Learning During COVID-19 Lockdown

Nyarai Tunjera 

Cape Peninsula University of Technology, South Africa
tunjeran@cput.ac.za

Agnes Chigona 

Cape Peninsula University of Technology, South Africa
chigonaa@cput.ac.za

Abstract: *The 21st century coupled with the COVID-19 worldwide pandemic is indeed imposing new demands on teaching and learning. Higher education institutions affected extensively educational institutions are mandated with the responsibility of inclusiveness and preparing students for realities of the current and unknown future. There has been heightened attention to educational technologies to mitigate the COVID-19 instigated disruptions. To ensure inclusiveness during future pandemics, there is a need to pay attention to the forms of digital technologies that students have access to (e.g., mobile phones, laptops, as well as applications they are using) in their areas. The article reports the use of multiple applications platforms to circumvent digital divide and help accommodate students who were not able to access the conventional institutional learning management systems. Using a qualitative exploratory research method, the study used the Universal Design for Learning framework to guide the synchronous use of multiple applications. A total of 165 pre-service teachers participated and completed the Google form surveys and 20 volunteered to participate in a focus group discussion. 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 the use of multiple platform intervention enabled them to make choices on what works better and was cost effective for them. They further indicated that this further reduced their anxiety caused by feeling isolated and left behind. The researchers recommend educators to explore digital tools that students have and are comfortable to work with, 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 COVID-19 pandemic highlighted the need for higher education institutions to seriously reconsider their 21-century relevance in the digital era. Before the pandemic, educators were used to the physical classroom learning set-up and used technology to upload notes, assessments and to communicate announcements to their students. Technology was used merely to supplement the traditional F2F teaching and learning.

The closure of institutions due to COVID-19 pandemic meant that traditional F2F teaching and learning was disrupted. This forced educators to adopt an emergency remote teaching and learning systems. However, educators were unprepared for this transition. In addition, many students had challenges accessing remote learning.

The educators 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 or smartphones. Attendance is an important measure of educational quality and a predictor of student success (Asmara 2020). Due to the students' lack of the basic digital tools educators continuously looked for ways to reach these students to reduce the loss of learning.

To mitigate the challenges unveiled by the COVID-19 pandemic, the HEIs were required to build more resilient strategies that could endure imminent catastrophe events. At the core of these mitigations is the empowerment of educators with digital pedagogical skills and resources. Regrettably, most HEIs were slow to adapt to the virtual learning environment. Educators were left to blindly explore and navigate the new digital

environments for teaching and learning (Chirinda, Ndlovu, and Spangenberg 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 on platforms and digital skills for reaching out to students. Students were encouraged to stay active in social media and online platforms supported by the institution for learning purposes.

However, the students from less affluent background still faced challenges and were lagging behind. It was this anomaly that motivated the researchers to innovatively deploy Universal Design Learning framework (UDL) principles in designing online learning that increase inclusivity for all students in spite of the diverse resource-constrained background. This study aims at exploring the effects of using multiple applications and devices for teaching and learning during COVID-19 lockdown. Online learning in this study includes asynchronous and synchronous modalities to effectively deliver lessons. This paper reports on how educators used a variety of technology platforms to realise equity and inclusiveness to access remote learning by most students.

Problem Statement

During the first quarter of 2020, school-based, F2F teaching and learning was deemed non-essential during the lockdown. The unforeseen COVID-19 lockdown led to an interruption of educational or teaching and learning activities as they were not categorised/considered under/as essential services. Inevitably, this brought forth a heightened attention to educational technology to mitigate the disruption. HEI had to introduce new learning systems for the continuity of academic activities whilst

abiding with lockdown protocols. However, studies have earlier observed that educators lack the knowledge and skills of teaching with technology (Chigona, 2015; Tunjera, 2019). On the other hand, studies reveal that 21st century students, regardless of where they come from, are exposed to social media and other interactive technologies. They spend most of their time chatting, exploring the internet and sharing audio and visuals (Quinlan, 2014; Teach thought, 2018). Hence, the reason the researcher explored multiple platforms in this study.

Literature covering the use of diverse online technologies have been explore, however, studies on the use of multiple platforms synchronously streaming are only emerging now, specifically in entertainment industry. The limited literature on the use of multiple streaming platforms in education is problematic considering the prevalent of ICTs in education and their immense potential.

The researchers recognised the need to explore the potential of using multiple platforms streaming of live classes to accommodate all students despite their technological challenges. The research can help provide a roadmap for educators interested in optimising the use of available technologies within their students. The research presents empirical use of multiple platforms and devices that students have access informed by the UDL framework.

This study sought to answer the following question;

How are educators using multiple platforms for teaching and learning to reach out to students from diverse background during the COVID-19 pandemic lockdown?

Literature Review

While most educational technology studies have concentrated in e-learning and mobile learning applications. However, due to the conventional nature of traditional institutions. Technology enhanced learning strategies were not fully deployed into educators' practices. New Horizon, SITE, ISTE and others continuously show and predict emerging technologies that promise to significantly impact education. In this study, researchers explored the Universal Design for learning framework and literature on the practicability of emerging technologies intervention they deployed during COVID-19 pandemic lockdown and beyond.

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 educator 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.

UDL researchers emphasize that technology integration in teaching and learning is not one size fits all. This is because students have varied strengths, experiences and preferences that could be dynamic depending on the 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. As indicated earlier on, students' variability on what technologies and connectivity will be of importance on designing inclusive online learning platforms (Chirinda et al. 2021; Tiba 2018; Udenze and Oshionebo 2020). South African is marred with the historical inequalities in resource distributions, students from less affluent households struggle to have access with teaching and learning resources.

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 (Rao 2021).

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.

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 (Sahrir et al. 2012). 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 consideration for online learning adapted from (Rao, 2021)

UDL design cycle	UDL based on Online environment	Factors considered
Student variability	Student online environment - how students engage and learn online.	Connectivity, devices, applications
Identify learning goals	Interaction, content sharing & comprehension	Synchronous and asynchronous lesson engagement
Develop assessment	Types of assessment Formative Summative	In-class question and answer 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

Table 1 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 (Rao 2021) 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 to use to reach out to all students.

Synchronously Using Multiple Applications Platforms in Online Learning

The term online learning is sometimes used synonymously with term eLearning where learning is delivered over the internet. Online learning uses electronic device that have access to internet and support various multimedia and application platforms. Online

learning has witnessed a steady growth and acceptance, even before COVID-19, mostly was used for professional upskilling. Many conventional institutions were using invested in LMS that were not used to the optimum by both educators and students. A study found that LMS has been used to supplement learning materials to help students prepare for assessments (Mlotshwa, Tunjera, and Chigona 2020). Interaction among the participants occurs mainly through email and online forums and mostly moderated by the instructor (Watts, 2016). Massive Online Open Courses (MOOCs) offered distributed open online courses accessible without cost (Ravenscroft 2010; Watts 2016). (Dobbs, Waid-Lindberg, and Del Carmen 2017) found online courses gave students flexibility to balance work and family schedules, the ability to reduce commuting cost and time, not to mention the availability of more online courses. Contrary, studies have reported

high attrition on completion rate between 20% to 50% and MOOCS in excess of 90%. Academic difficulties and technical challenges were sighted as the major reasons for the high dropout (Watts 2016; Weinhardt and Sitzmann 2019).

However, due to COVID-19 pandemic, the sudden shift from the physical classroom to online learning environment saw educational technology (EdTech) companies responded to the significant demand by increasing the capacity and improved their features on virtual learning platforms, using real-time video, audio, and chat on live classes streaming. On the other hand, studies reveal that online learning was driven with technology rather than the students' support need (Su and Waugh 2018). (Kanwal and Rehman 2017) in their study observed that online learning platforms were used as broadcasting tools without tapping in their affordances. Regrettably, little consideration has been given to identifying the factors that directly influence online learning adoption.

The emergence of cutting-edge smartphones and other high-quality devices with high resolution, large screen size, and other display features has improved the accessibility to online learning resources (Rehm et al. 2020). The increasing access to rich online platforms and media, can transform the online learning delivery through an increased opportunities to advance ICT integration, use rich multimedia, remix content, in response to online teaching and learning challenges.

A number of studies have demonstrated the benefits of integrating social media into learning (Greenhow and Galvin 2020) or of teaching with specific social media such as Facebook (Manca and Ranieri 2016) or Twitter (Mäkitalo et al. 2012), WhatsApp (Mulyono, Suryoputro, and Jamil 2021). Most of these

studies explored the use of online platforms on the affordances of individual single platforms. Henceforth, favouring technologies not students' variability

Literature lacked studies that explored the use of multiple platforms synchronously in line with what is at the disposal all students. Multiple platforms and across devices is being used in entertainment to reach out a wider audience and followers. Using multiple online platforms offer new opportunities for participants engagement, providing different channels with video, audio-only, or text-based methods.

Emerging Educational Technology

An emerging educational technology is one that is not in 'common' use currently in education, but which has the potential to be more widely adopted to support and provide learners with easy access to learning and affords instant interaction. In this study, the emerging technology will include applications and devices that enable content delivery and interactions amongst students and educators. The following sections cover the description of each emerging technology platform's affordances and how it is used in the teaching and learning.

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.

Studies that explored WhatsApp in teaching and learning emphasized its widespread social use with over one billion active subscribers, with the majority of users

being the younger population (Asmara 2020; Mulkalwar et al. 2019; WhatsApp_Inc 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_Inc, 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 (Asmara 2020; Bouhnik, Deshen, and Gan 2014).

The affordability of WhatsApp is key for its usability in teaching and learning as an alternative technology to reach out students. Service providers offer data bundles to most social media platforms. A monthly WhatsApp bundle, costing an average of thirty rands, messages can be downloaded once and can be read or responded whilst offline. A feature on setting up Students can set when to download videos and images (WhatsApp_Inc, 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 (Jackson 2020) as an instructional tool in blended learning. The COVID-19 pandemic revolutionized the way educators view technology, especially social media applications that were shunned by educators as destructive in nature (Bouhnik et al. 2014; Rambe and Bere 2013). However, due to COVID-19 educators used available

digital resources and popular with most was WhatsApp mediated learning. Educators realised that WhatsApp plays a critical role in helping to stay connected with their students due to its wide user base and end-to-end encryption. Therefore, they developed and explored ways of using WhatsApp to teach, assess and interact with their 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, Dobinson, and Kent 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 (Rojabi 2020). However, for multiple MS Teams accounts institutions pay commercial licences, of which registered students are covered to access all the features.

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 or online radio channel is a radio program that offers listeners a broadcast service using world wide web infrastructure instead of using radio frequencies (Mixlr 2022). Listeners can listen to this service online via a live stream, using a computer or smartphone (Mbagwu, Ozioko, and Ogueri 2017). 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 2022). 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.

In a study, (Vryzas, Tsiapas, and Dimoulas 2020) posted that online radio broadcasting requires minimal connectivity compared to other online learning platforms, radio possibilities are limitless for education. 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 in 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 shared 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

A detailed qualitative study used a single case study approach. This study followed descriptive research design is used to evaluate, explain and validate the findings of a specific intervention implemented in real-life contexts (Yin, 2014). The methodology offers a better understanding of pre-service teachers' insights, attitudes regarding the effectiveness of synchronously multiple platforms and devices.

Research Methods

A pre-survey questionnaire was developed using the key concepts of the UDL framework. The closed-ended questionnaire sourced what technologies students have access to and types of connectivity they were using to connect online. Students had opportunities to provide input on inclusiveness and equity to online 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. Both pre-survey and post-surveys questionnaires were sent to all second-year intermediate phase (IP) one hundred and twenty (120) students enrolled in 2021 academic year. The 90 and 78 students responded respectively.

The focus group interviews were used to solicit for in-depth understanding of students' experiences of using the multiple platforms in a formal learning environment. 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.

The research instruments were examined for validity by team members checking on adequacy, quality, relevancy, completeness and comprehensibility.

Sampling

All the 165 second-year intermediate phase (IP) pre-service teachers enrolled in the Professional Studies course, automatically received the questionnaire in the study. This group of students was targeted for convenient purposes; one of the PI investigators was the Professional Studies instructor. Twenty students volunteered to participate in the virtual focus group interviews (FGI).

Enrolling students to all the platforms

For students to be part of a group they had to be 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 the BlackBoard announcement and the class representatives also shared with others in their other social networks.

All students registered for the course were automatically linked to their respective registered modules, giving them access to BlackBoard LMS and MS Teams class sections. Blackboard and MS Teams facilitators can create content and upload content in text, audio or video formats, create assessments; mark online and generate a marks gradebook. However, these platforms work better with some smartphones, not with others. In both these platforms attendance registers could be downloaded that shows when someone joined and exited the class given in report format. In teams the report is sent to the chat section of the class and in BlackBoard collaborate will automatically take attendance if track attendance is set, and record under grade centre.

WhatsApp groups

The WhatsApp group feature accommodates up to 256 participants (WhatsApp, 2021). (Gachago et al. 2017; Rojabi 2020) have shown the positive impact on a community of practice in which students interact and work together to achieve a learning goal. The class representatives created a class WhatsApp group and the link was shared with members who joined the group voluntarily. To control the group, only class representatives were set as administrators and set times when all group members could post. 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 website resources were also shared in the group WhatsApp platform.

Online radio channel

The researchers further registered and paid a 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. At the end of each session attendance statistics were sent on email.

To ensure that the process of the study's data collection and analysis was credible and trustworthy, transcribed data were sent to three pre-service teachers to verify the accuracy of data. The raw data were discussed with participating pre-service teachers for member checking to ensure that it represented what they had said. Ethical clearance was obtained from the Faculty of Education Ethics Committees. Participation in the study was voluntary (Maxwell, 2013). Participants were informed of their right to withdraw at any stage of the study and were assured that no further information would be gathered about their activities and would not affect their progress in the course nor any assessment of their work. Pseudonyms or codes were used to preserve participants' identity.

Data Analysis

The researchers used the questionnaire data to determine the type of affordable digital technologies. At the end of all the training offered to the pre-service teachers on how to integrate affordable technologies and the 21st Century skills into teaching. 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 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.

Findings and Discussion

In this section, the emerging themes from the data are presented and discussed. The UDL framework was drawn upon to interpret the findings. 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.

Student's Digital Resources Variability

As highlighted earlier the surveys were used to explore students' variability in terms of their online environments, technology readily accessible to them and finally their experience on multiple platform strategies used. 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% and 58% students had access to MS Teams and

Blackboard respectively. 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.

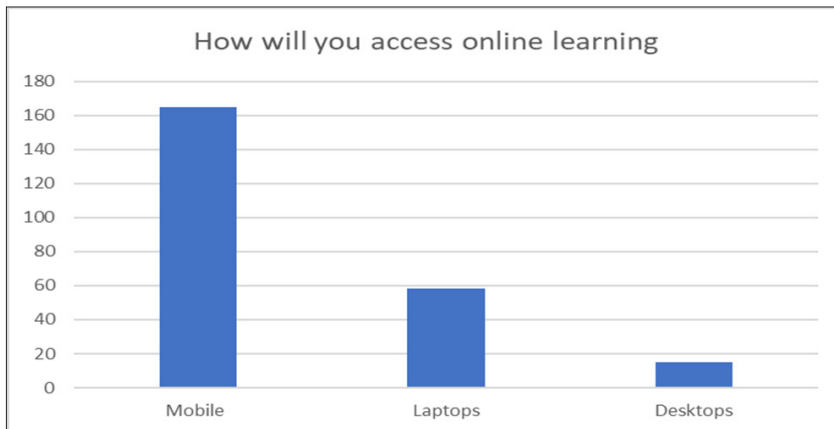


Figure 1
Devices used by students to access online classes

According to the UDL framework, educators should aim to support students by reducing barriers and maximizing learning by creating equity, and providing an opportunity for all students to achieve (Rambe and Bere 2013). In this study, researchers identified what digital resources students had access to for continuity learning during the COVID-19 lockdown period (see Figure 2). UNESCO (2020) reported 11% of the students in Sub-Saharan Africa are not covered by network coverage. TPACK framework challenges educators to use effective teaching strategies that help students achieve learning outcomes within their contexts (Voogt and McKenney 2017). Henceforth, UDL encourages educators to take the responsibility of creating an inclusive learning environment. Technology has made significant contribution to reduce

barriers that hinder students access to live classes. This implies that educators can use the available digital resources at the disposable to students. In other words, the use the digital devices such as mobile phones which every student owns or can access. Educators must embrace the diversity in our classes as well as use the best technology available to students.

Multiple Streaming Across Platforms

Multiple streaming refers to simultaneously broadcasting to more than one platform. Educators raised concerns of limited or lack of digital resources to some students and communities (Oakley, 2017). However, as discussed earlier, the goal for educators is to create a inclusive learning environment to reach out to all students.

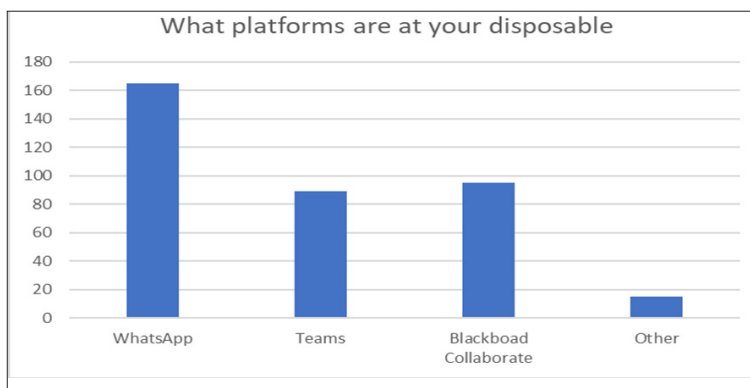


Figure 2
Platforms available to students

The researcher explored on what platforms do the students have access to that can be adopted for used as mediums to reach out to all students regardless of their acceptance in education fraternity. Educators were hesitant to adopt platforms such as WhatsApp due to its egalitarian nature (Bouhnik et al. 2014). On the contrary, studies are showing the positive impact of social media platforms (Baishya and Maheshwari 2020). Figure 2 shows that most students have access to social media platforms, especially the WhatsApp. Our students have access to multiple social streaming platforms, which they access using their mobile devices. Therefore, educators can creatively innovatively use social media into their disciplines. Invest in the digital devices that make it possible to use multiple platforms simultaneously and reach out to all students.

Safar and Alkhezzi (2016) recognised that streaming to multiple platforms ensures that you create and reach across all students who have access to the platforms being used thereby reaching a greater audience. 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 management platforms, the researchers realised the importance of cross platforms students have access to. The educator logged in all four platforms, WhatsApp desktop, Blackboard collaborate, MS Teams and the online radio. The researchers used dual extended screens see Figure 3 below.

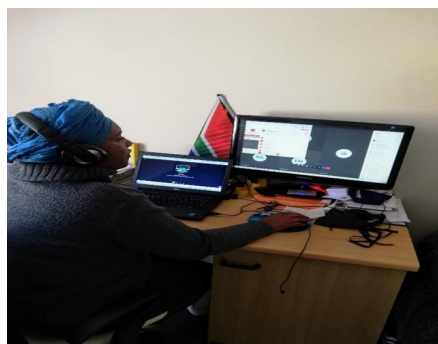


Figure 3
Researcher's setup with external headphones and microphones

The above Figure 3 shows the researcher's live class session, of which all the four platforms were running simultaneously and synchronously. The pictures were taken when the lecture was starting.

The setup revealed the inclusiveness of streaming using multiple 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, as she was using a microphone across

the three platforms (see Figure 4). Worthy to note is that the multiple platform streaming is a skill that anyone can master through practice.

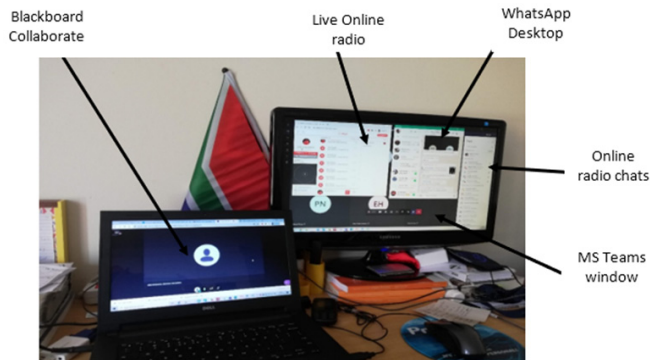


Figure 4
Showing the four applications running synchronously

The students who were connected to the Virtual online class using Teams or Blackboard directly could see the presentation directly. Those connected through the radio could listen live to the discussions and contribute using the chat or send WhatsApp messages. 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 affordance below illustrates the affordances of each of the platforms and what they offered to help increase inclusiveness in remote learning.

Table 2
Platforms Used and Affordance

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

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 of the educator, as well as the level of data usage. This analysis helps users to understand the affordances of each application being used.

Given the different choices of 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... I later downloaded the radio app, it really worked for me... with time I was able to engage through the radio chat...

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. This student later on mentioned migrating to an alternative platform and they further improved their technology skills.

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 on missing out on the part of the students. The concept of flipped classroom model gives students autonomy to read and do research at home and increase engagement during the F2F virtual meeting (Strecker, Kundisch, Lehner, Leimeister, & Schubert, 2018; Schleicher, 2014). In this study, 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 contrary, proponents argue attending classes increases as students get engaged and actively participate in online class (Rao 2021). 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. This reveals the positive impact of availing content using multiple platforms for learning, communication and collaboration.

Increased Access to Content in Variety of Formats

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 Collaborate 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 gave students peace of mind, despite not actively attending classes due to connectivity challenges. According to studies, lesson recording helps students to easily access content anytime which gives them catch up time so they do not lag behind (Topale, 2016). 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

The recordings enabled students to access content anytime and anywhere. Therefore, providing flexibility to view and review content at students' own pace. Studies reveal that educators recording class session helps students relearn, self-correct and rephrase as they think (Zachos, Paraskevopoulou-Kollia, and Anagnostopoulos 2018). This implies that recorded class sessions can also help students identify concepts they are struggling guiding them on what to focus on during class discussions in the various platforms.

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 applications instructional strategies

Multiple application and devices online streaming demonstrates the power of using technology. However, the online media affords

access to all students despite physical distance that separates them. 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 (Rao 2021). Educators need to practice skills and focuses on their development of efficacy, further helping students develop skills.

Platform Live Session Attendance

As indicated earlier, each platform has a way of providing an attendance inbuilt attendance monitoring system. The table below gives a summary of attendance as per platform. WhatsApp was not included as all registered students were part of the class group.

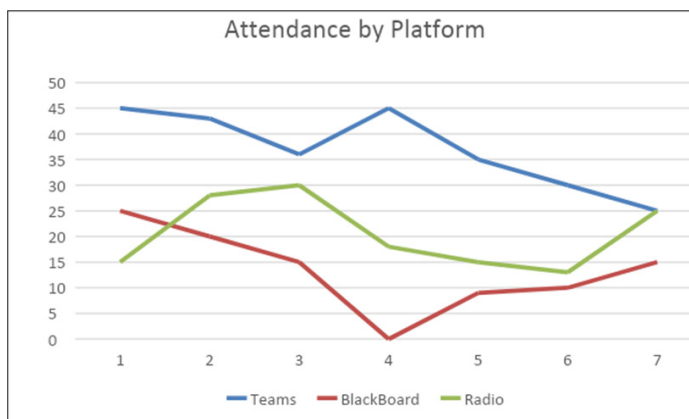


Figure 5
Platform Live Sessions Attendance

Figure 5 shows that students adopted the platforms that were accessible to them, it was interesting to observe how MS Teams was predominately used by most students and few resorted to the institution's Learning Management System (LMS). A new low data intervention started slowly but surprisingly picked momentum and reached an equal connectivity as MS Teams. One student reported

One day my MS Teams app was not letting me join the live class, fortunately I

downloaded the radio app. I joined, I was surprised that I could listen as if I am in Teams, from that day I started joining the class using the radio which was data efficient... when Dr Nyarai spoke about the radio my mind had the usual radio...but I could also send chat messages during the Live session....

The above extract indicates that students' perceived usefulness, perceived accessibility and cost effectiveness could have contributed to the above analysis. Therefore, giving students the opportunity of choosing what

works for them helps increase participation. Similarly, researchers (Kartal 2019; McLoughlin and Lee 2010) suggested using what is familiar to learners is key to foster autonomy and increases engagement which are critical elements in nurturing inclusiveness in online learning environments. The finding is consistent to what researchers suggest that giving learners autonomous in choosing that which they are comfortable and have access to will indeed increase engagement, thereby positively impacts on the learning outcomes.

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. An enabling learning setting will help improve attendance, further reducing dropout rates.

Study Implication

The study demonstrates that inclusiveness and equity are critical drawing on UDL principles. The researchers' capabilities manifested in their multiple platform streaming using multiple devices to reach out to students who were physically separated. Synchronous and asynchronous engagements within the multiple platforms ensured more authentic and meaningful learning. The effects of using social media, WhatsApp, Mixlr radio link, MS Teams and BlackBoard learning management systems suggested a shift from teaching with the technologies to teaching within these technologies. The affordances and transformative timeous adoption of the digital

technologies that students have access to is a critical skill that educators and institutions should explore rather than deploying rigid formal application ignoring what the students has access to.

Conclusion and Recommendation

The use of multiple platforms synchronously revealed that technology significantly removes barrier of accessibility to certain application and devices. This study guided by the UDL framework demonstrated the how educators can use of multiple platforms synchronously, which is prevalent in the general social entertainments to reduce loss of learning during the COVID-19 pandemic lockdown periods. The study further showed using UDL to design multiple platforms and devices will cater for all students despite their challenges. It is crucial to observe that COVID-19 pandemic raised the need for inclusiveness in the online learning environment. Henceforth, necessitating educators to be creative and think outside the box.

Streaming live classes using multiple platforms across devices is prevalent in social entertainment and engagements. Therefore, using them for teaching and learning ensures that not one student would be left behind. This study realised that synchronously using multiple platforms reduce the barriers of students and educators' digital resource-constrained environment. The educators and students' self-initiative through strategic class community generated networks became ideal for academic survival. The study, further showed how synchronously using multiple platforms will optimise access associated with the use of technologies in resource-constraint environments.

The researchers recommend that educators

should find ways of accommodating all students 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 this promise to reduce the digital divide and increase inclusiveness. This study demonstrated the possibility of HEI could adapt and guarantee a holistic equity and inclusive environments in order to limit further gaps amongst students' populations.

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Authors:

Nyarai Tunjera

Cape Peninsula University of Technology,
South Africa
tunjera@cput.ac.za

Agnes Chigona

Cape Peninsula University of Technology,
South Africa
chigona@cput.ac.za

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