Fostering an Equitable Curriculum through Communication Technology for Third-Year Students

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Abstract

The study explores the gravity of adopting communication technology for successful learning in the post COVID classroom. Success – for third-year students and lecturers in the 21st century and beyond – is inevitable when students are exposed to a variety of communication technology in their learning. Even beyond the classroom, there are numerous benefits to being tech-savvy. With the abrupt shift from the classroom in many parts of the globe, some are wondering whether the adoption of online learning will continue to persist post-pandemic, and how such a shift would impact the worldwide education market. While internet penetration has grown in leaps and bounds over the past few years, in some institutions of higher learning, a consistent connection with a decent speed is a daunting task. Without a consistent internet connection for students and lecturers, the education process is doomed. As students become more adept at assuming responsibility for their own learning, the use of technological tools will become indispensable. As evidenced during the COVID-19 peak, online learning was normal for higher education and training institutions that had already implemented fully-fledged technology in the classroom, while this was not the case for other South African institutions. Thus, curriculum equity can impact factors such as student engagement, productivity, satisfaction, improved performance, creativity, and commitment. A qualitative approach was employed in this study.

Keywords: Communication technology, post COVID, Curriculum equity, Diverse students

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1 Introduction

Given the increased adoption of technology for effective teaching and learning in Higher Education Institutions (HEIs) post COVID, studies have been conducted to ascertain its effectiveness. The global pandemic spread at an alarming rate, resulting in lockdown restrictions in order to 'flatten the curve' through several measures that resulted in online learning and teaching (Ramiah 2020). In South Africa, schools and universities closed on 18 March 2020 and reopened in a staggered approach, affecting approximately 2,3 million students enrolled in post-school education and training institutions (Statistics South Africa 2022). Globally, schools were closed for an average of 3,5 months (14 weeks) since the onset of the pandemic (UNESCO 2021). Although the introduction of lockdown restrictions aimed to prevent the spread of COVID-19, it also presented an opportunity for HEIs, particularly for students to learn through technology.

Using communication technologies in HEIs has also been found to be a compelling means to expose students from previously disadvantaged communities to technology innovations (Rakhno & Shramko 2016). Introducing online learning resources and platforms offers a wide range of techniques for information sharing between students and lecturers, producing self-designed content, providing opportunities for professional development in various activities, and regular communication between students and lecturers alike. Henrie, Halverson and Graham (2015) note that technology-mediated learning is strongly related to learning engagement and participation. On the other hand, learning engagement is positively associated with desirable behaviour, such as learning interest or satisfaction (Deng 2021). These factors highlight the importance of adopting communication technology for learning and, in turn, preparing students for the future world of work.

According to Andress, Star and Balshem (2020) and Bauer (2019), learning through technology occurs in various forms, including webcasts, virtual tutor sessions, online discussion forums, webcasts, video and audio conferencing, podcasts, blogs, and computer-based applications. These tools motivate learning by making online education 'fun and enjoyable' (Ulukol 2022:536). A key benefit of this learning platform is that it empowers students to actively participate in classroom discussions and two-way communication with lecturers (Stoklosa, Ding & Yanagawa 2021). Accordingly, using technology has become a requirement for HEIs.

This study aims to explore the gravity of adopting technology to achieve an equitable curriculum in which the lecturer and students are an integral part of a significant exchange. In order to achieve this, it is important to understand what technology offers HEIs. The following research questions were developed to address the purpose of the research:

a) How does technology promote an equitable curriculum?
b) What learning challenges do students experience when they do not have access to technology?

1. Literature Review

Student participation is a key factor that can facilitate HEIs students' learning. Through communication technology, there are numerous benefits of learning for students of varying ages, backgrounds, nationalities, and professions (Stoklosa *et al.* 2021). Accordingly, technology-mediated learning has become crucial in the 21st century (Gopo 2022), particularly post COVID-19. Evidence suggests that if used appropriately, technology can create learning outcomes comparable to or better than classroom-based learning (Stoklosa *et al.* 2021). In addition, current technology allows for distance learning as lecturers can pre-record or live stream classes to students across vast geographical locations. The diffusion of innovation theory explains how an innovation gains momentum over time and is 'diffused'. This process results in people within a specific population or social system adopting the innovation (Rogers 2003).

Nevertheless, moving learning from the classroom to an online environment has also presented teaching and learning challenges. The lack of provision and access to the necessary infrastructure for students' online education means that economically marginalised students are already disproportionally affected. Some students struggle to participate in online learning without internet connectivity and a reliable power source (Ulukol 2022; Pokhrel & Chhetri 2021; Mabolloane 2021). This is seen in students from low-income families and foreign students (Jain, Lall & Singh 2021). For example, 37% of South African households have consistent access to the internet through cell phones or computers (Hanekom 2020). More glaring disparities existed at the provincial level; Polity (2017) recorded that the North West and Limpopo Provinces have the lowest access to the internet at home,

at 3.6% and 1.6%, respectively. The vast majority of South Africans accessed the internet outside the home, that is, at work (15.0%), in internet cafés or schools and universities (9.3%), and through mobile devices (47.6%).

Accordingly, South African HEIs have adopted technologies to address their challenges. Some of these include the soaring cost of education; lack of government funding, if any; pressures to improve efficiency and throughput; increasing the proportion of students in the higher education sector (Department of Higher Education and Training 2012), and diverse levels of preparedness of students (Ng'ambi, Brown, Bozalek, Gachago & Wood 2016:3). Conversely, the increase in the use of technology leads to an increase in technology-related abuse incidents. For example, in a study conducted by UNICEF (2020) and Babvey (2020), it was shown that internet and social media reliance increased during COVID-19; however, the data shows a significant increase in the streaming of abusive content (France24 2020). In addition, previous studies have also found that using video to deliver learning materials negatively impacts students' participation, thereby reducing perceived learning (Hu & Hui 2012).

A study conducted with Spanish university professors found that the pandemic had significantly launched teaching towards the use of Information Communication Technology (ICT) and online education (Rangel-Pérez, Gato-Bermúdez, Musicco-Nombela & Ruiz-Alberdi 2021). In the Czech Republic, Kozlova and Pikhart (2021) conducted a study focusing on students' perceptions of implementing ICT in higher education. Additionally, ICT is slowly being introduced in Nigerian tertiary institutions due to the transition of the global media (Oyedokun & Adeolu-Akande 2022). Despite the increased technology adoption, students' exposure to various communication technology in their learning is a largely unstudied area of research. Therefore, this study aims to explore the importance of adopting communication technology for successful teaching in the post COVID classroom. The third-year students of two historically disadvantaged universities of technology in South Africa was used as a case study.

2. Theoretical Framework

When considering the impact of technology on learning, the diffusion of innovation theory provides a framework to consider the influence of technology on learning. This theory is concerned with how innovation spreads or

gets acceptance from society after a period (Rogers 1962). An innovation can be defined as 'something new that can create value, the integration or generation of new ideas to generate products or services is widely viewed as a key driver for a country's economic growth' (Reaiche, Corral de Zubielqui & Boyle 2016:57). In the context of this study, communication technology is critical in order for HEIs to create an online learning culture that is efficient in ensuring students' uninterrupted learning and two-way communication with lecturers. Thus, in agreement with Reaiche, Corral de Zubielqui and Boyle's (2016) definition of innovation, it can be said that innovation is the implementation of new ideas, new concepts, and new ways of doing things.

There are four main elements in innovation diffusion, namely innovation, communication channels, time, and social system (see Figure 1) (Rogers 2003). However, an innovation is characterised by the following attributes, which impact the rate of innovation adoption:

- **Relative advantage:** the advantage of adopting the innovation in comparison to what the user previously used *(the advantage is that the academic year was not delayed further due to lockdown restrictions, including future challenges such as ill-health and lack of access to resources).*

- **Compatibility**: how the innovation addresses the user's needs *(providing students with access to their lecturers and uninterrupted learning).*

- **Complexity:** the ease or difficulty with which the innovation is viewed by the user *(providing students with training on how to use the various applications and technology software).*

- **Trialability:** the ease with which the innovation can be trialled or tested *(the adoption of communication technology before a global pandemic where students submitted assignments online and had e-tutors).*

- **Observability:** the degree to which the results of the innovation are visible to others *(the results of adopting communication technology may result in lecturer effectiveness and student throughput).*

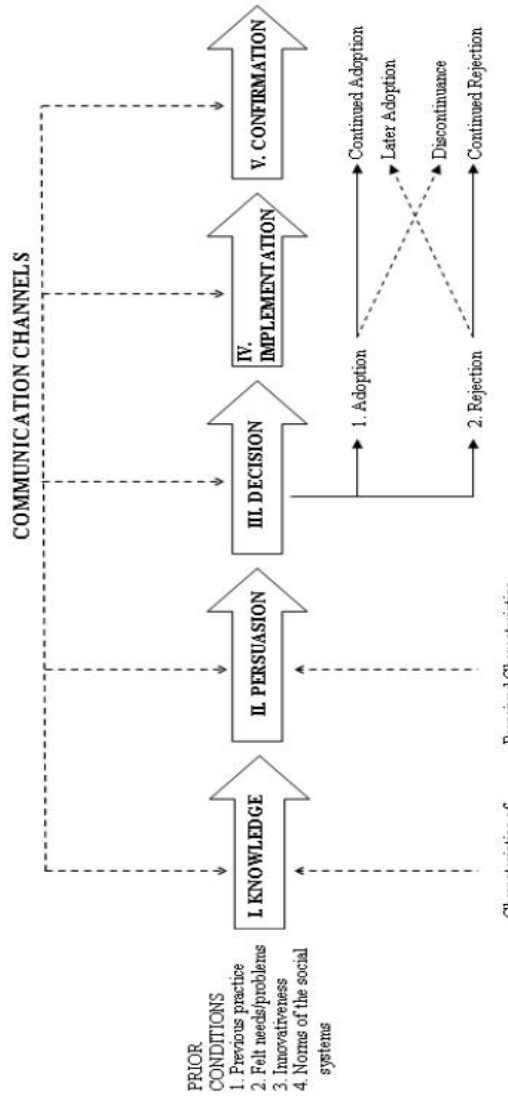

Figure 1: A model of the five stages in the innovation-decision process (Rogers 2003)

The five stages highlighted in Figure 1, are briefly discussed below (Rogers 2003):

i. **Knowledge:** An individual learns about an innovation and asks questions such as what, how, and why. In other words, the individual uses this stage to learn more about the innovation.

ii. **Persuasion:** In this stage, the individual shapes their attitude after knowing about the innovation.

iii. **Decision:** An individual continues to search for innovation evaluation information and messages in the decision stage.

iv. **Implementation:** The innovation is adopted in this stage. However, some uncertainties about the innovation still exist.

v. **Confirmation:** In this stage, individuals look to others to support their decision about the innovation .

For the purpose of the study, it can be argued that students should be introduced to communication technology and given an opportunity to use it. They should then implement the innovation and use it as a trial in the classroom environment in order to get students' buy-in. Each of these stages should be accompanied by an individual reflective process.

In summary, communication technology that offers a relative advantage, compatibility, complexity, trialability, and observability may have a faster adoption rate than other innovations.

3. Research Methodology

A qualitative research approach was selected for this study as the aim was to explore the gravity of adopting communication technology for successful teaching in the post COVID classroom. The setting for this study was two historically disadvantaged universities of technology in South Africa. The students' consent was required in order for them to participate in the interviews. They were also informed of their right to withdraw from the interviews at any time.

The researcher identified six potential lecturers whom she contacted. However, only two responded, after which they were requested to identify

participants for the study. Thus, the snowball sampling approach was used to find additional participants. This approach entailed receiving referrals from initially sampled individuals to other respondents believed to have the same characteristics (Johnson 2014). The participants were selected according to specific criteria, which dictated that all students had to be in their third year of study and in different faculties to ascertain whether these students had the same experience. Therefore, fifteen (15) students participated in the study from the two historically disadvantaged universities of technology in South Africa.

Due to the increasing COVID-19-positive cases in South Africa, the study used online interviews conducted via Microsoft Teams. This involved conducting a series of 30-minute interviews with each participant. Participants were encouraged to share their experience of using technology for learning as third-year students at a university of technology. Each interview was recorded and transcribed verbatim thereafter (McMullin 2021).

Data analysis was prescribed by Braun and Clarke's (2006) six-phased thematic analysis. The thematic analysis is described as 'a method for identifying, analysing, and reporting patterns (themes) within data' (Braun & Clarke 2006:16-23). The first phase entailed transcribing the field notes and interview transcripts into written form in order for the researcher to familiarise themselves with the data. Secondly, data extracts with similar codes were grouped together for ease of analysis when building themes. Thirdly, the different codes were sorted into potential themes. By the end of this stage, the researcher had used the data to identify and develop themes and subthemes based on the data. In the fourth phase, potential themes identified in phase 3 were reviewed. The fifth step involved refining and naming themes, and determining what aspect of the data each theme captures. Finally, in this last step of the data analysis process, the researcher produced a written report discussing the themes.

4. Findings

Fifteen (15) interviews were conducted with students from two historically disadvantaged universities of technology in South Africa. Students identified five challenges that contributed to their online learning experience, namely inadequate resources, data costs, technical challenges, network-related issues, and access to the lecturer.

5.1 Inadequate Resources

One of the most predominant themes emerging in all the interviews was related to inadequate resources. Student responses indicated that access to adequate resources is a key element to success in their learning. Resources ranged from literal learning materials to more complex resources involving government intervention. Most of the cited resources included quality smartphones and gadgets, relevant technology, access to a computer, 3G modem or WiFi for internet access, reliable internet connectivity, prolonged power outages without alternative access to power, access to libraries when studying remotely, and other digital learning material. Access to resources extended beyond the online class. Some students remarked that their classmates were successful because they came from well-off families that could provide them with the necessary learning resources.

Several examples illustrate this:

> *'There's only so much my parents can do for me' (Participant 03); 'I guess if I were from a better family, then I would have no excuse because I have access to all the learning gadgets' (Participant 06); 'I have to take a taxi to town to get to the nearest internet café, sometimes they don't have network, or there's load shedding, which is a waste of my time and money' (Participant 07); 'I wish the was another way out because I am struggling to get a decent phone that connects to these apps' (Participant 08); 'It's not easy to join the online classes or even learn remotely without these fancy technologies that others have, but my parents are doing their best' (Participant 11);* and *'My parents don't have much, but I'm grateful that they invested in a laptop, smartphone, and 3G for me – I know it's not enough but it's a start …. Some of my classmates don't have these basics, while others have access to more than' (Participant 15).*

Other students commented on how this affected their engagement levels:

> *'It's difficult to be engaged in the online classroom when half the time You are worried about being kicked-out as a result of your phone disconnecting every 5 minutes' (Participant 01); 'I am mostly disengaged because I don't even have access to the learning material, online classes, and online discussion forums' (Participant 04); 'It's difficult to engage*

> *in an online lecture when you don't have a private space to connect from at home' (Participant 05); 'How do I engage with the curriculum when I cannot even access a library for more reading material?' (Participant 09); 'I am not as engaged as I was in the traditional classroom' (Participant 10);* and *'The university should consider engagement strategies to help students from disadvantaged backgrounds' (Participant 15).*

In contrast, one student was of the opinion:

> *'I'm starting to think that this is a way to exclude the disadvantaged students from online learning, which is already an unfair 'solution' because most of us don't have access to the learning technology that is intended to "assist us" – or so they say' (Participant 02).*

Another student raised a crucial question, which raised matters relating to inclusion:

> *'What about differently-abled students, how are they catered for in an online learning environment?' (Participant 04).*

As explained by Rogers (2003), the adoption of a new idea or innovation does not happen simultaneously in a social system; rather, it is a process where some individuals are more open to adopting a new innovation. Although this may seem like the case in this study, it is also important to note that students in this study had inadequate access to resources; thus, they were disengaged and lacked commitment to their studies. Thus, the probability of students adopting communication innovations was negatively influenced by their poor access to resources.

4.2 High Data Costs

Access to data costs provides an opportunity for student engagement and creativity. However, students indicated that the high data costs hindered their engagement in the online learning environment. Moreover, data costs impacted the quality of their assignments compared to students whose parents could afford it. Such hindrances included identifying opportunities for creativity in their online learning and how they completed assignments.

Some students commented directly on their experiences of high data costs in an online learning environment. For example, students shared:

> *'The high cost of data is another issue that affects my engagement in the module and overall experience of online learning' (Participant 03); 'The top achievers in my class have access to WiFi, Fibre and 3G at home, and internet in their parents' place of work, etc.' (Participant 04); 'I am unemployed so how will I afford data? My bursary only covers tuition' (Participant 05); 'Data is too expensive; how am I supposed to commit to completing this degree?' (Participant 08); 'In traditional learning in the classroom, we had access to computer labs on campus and in the residence; buying data was never a concern' (Participant 09); 'I wonder what happened to the #datamustfall movement. Data is too expensive; I can barely afford it' (Participant 10); 'I hope at some point the university will provide us with data vouchers to help us submit assignments timely and engage in the online forum' (Participant 12)* and *'My mother has spent a lot of money on data thus far, yet the year is far from over' (Participant 14).*

Another student remarked,

> *'If data were not a concern, I would be productive and committed to my studies' (Participant 15).*

Moreover, creativity was identified as an essential element of being engaged in an online learning environment. Creativity in this context refers to the additional efforts students put into their work. Students shared:

> *'I get engaged when my creative juices flow' (Participant 01); 'Imagine how well we would do if we had access to the necessary resources and were also creative?' (Participant 06); 'I believe the corporate world is looking to hire graduates that can find creative solutions to resolve complex issues in the workplace, but this excludes some of us' (Participant 07); 'The only reason I download study materials to read in the evenings is that I love what I'm studying' (Participant 11); 'The online learning environment also means that I am encouraged to 'think outside the box' and do things differently' (Participant 14)* and *'Finding innovative ways*

> *of presenting and submitting our work should be top of mind; in the same way the university established new ways of teaching us during the pandemic' (Participant 15).*

Another student remarked,

> *'Without creativity, there's no reinvention or innovation' (Participant 06).*

Some students have a clear sense of the role that creativity plays in their learning. One student noted:

> *'Creativity motivates me; thus, improving my performance; it helps me think of creative ways to implement what I've learnt and question the status quo. It also encourages the class more because we all want a sense of fulfilment at the end of the semester' (Participant 01).*

4.3 Technical Challenges

Students identified technology-related challenges as a result of being disengaged in their school work. Students' responses indicated that they would be more engaged and committed if they didn't experience any technical issues. In turn, it is suggested that this would increase their productivity levels, satisfaction with their HEI, academic performance, and creativity. Some students noted:

> *'Some of us didn't grow up with technology in the house, which is why we are not confident with learning apps, online forums, etc. The thought of technology scares me …. This explains why I get other people to type out my written assignments' (Participant 02); 'Unfortunately, people like me only saw a computer for the first time at university; thus, it automatically excludes us from engaging in online forum discussions as technology is still very foreign' (Participant 03); 'If only all students were exposed to the same technology then others wouldn't have an unfair advantage over others' (Participant 07); 'I believe I owe my disengagement to the technical challenges I face' (Participant 11);* and *'Online learning has created a division between the advantaged and disadvantaged students;*

> *it is clear who has parents that can provide them with access to technology and those who don't, causing a further divide between the haves and have-nots. Unfortunately, this leaves most of us feeling uninterested' (Participant 13).*

In addition, commitment is mentioned in several student responses. For example, as one student noted:

> *'Being tech-savvy made it easier for me to commit to my studies' (Participant 09).*

This commitment also encouraged more students to read additional course material at home. For example:

> *'I felt more committed by downloading material in the evenings to read in preparation for the following days' lectures' (Participant 07).*

Another student added,

> *'Previously, I would engage in other conversations with friends on my phone during a lecture. However, due to my engagement and commitment to my studies, I instead search for examples on my phone or computer during a live lesson presentation and use that material to gauge whether I understand the topic at hand' (Participant 12).*

Moreover, for some students, a feeling of commitment enabled them to focus on their learning differently. One student noted:

> *'Being committed made the course content more enjoyable, which enabled me to focus during online discussion forums' (Participant 02).*

4.4 Network-related Issues

Students who were committed also reported network-related challenges. Several examples illustrate this point:

> *'I want to do well this year, but we never have network in my area' (Parti-*

> *cipant 04); 'I have tried three service providers but still can't connect in my village, so how will I commit to my studies?' (Participant 09); 'Unlike other students, network is my biggest challenge' (Participant 10); 'It's difficult to join the online lectures – never mind conducting research for my assignments – when one doesn't have a stable connection' (Participant 13); 'I have poor audio and video quality as a result of network-related challenges' (Participant 14);* and *'I miss campus because we always have coverage in the computer labs; it's difficult to do anything from home' (Participant 15).*

For one particular student, the lack of network or coverage may have contributed to her negative response,

> *'I don't feel the need to participate because the university couldn't be bothered to understand our frustrations with online learning, including network challenges, inadequate support from lecturers, access to learning material, to name a few' (Participant 02).*

In contrast, some students highlighted that a stable network would afford them equal opportunities, similar to their advantaged classmates.

> *'We would finally have equal opportunities to education' (Participant 05); 'The advantage of having coverage in your area means that you would not miss out on lectures and activities, thereby ensuring equal access to online learning' (Participant 08); 'It's simple, a stable network results in well-performing students because we would all be able to attend lessons, something that is not always possible for the less advantaged' (Participant 10); 'There's more to online learning that just attending classes – I would be given an equal chance to be successful in life' (Participant 02);* and *'Equal opportunities, which means that we would all have a role to play in the future of our country' (Participant 03).*

Based on the above, it can be said that the high data costs, technical challenges, and network-related issues are elements of complexity. For instance, while students are keen to adopt communication technology, they encounter challenges such as load shedding, poor connectivity, and inadequate access to resources, which deters them from further engaging in online learning.

4.5 Access to the Lecturer

Several students reported a positive change in their productivity levels when they had access to their lecturer. This shift was most notable among students who described themselves as,

> *'average performer' (Participant 02); 'reserved' (Participant 03)* or *'easily distracted' (Participant 11).*

One student noted:

> *'I am usually an average performer, but having access to my lecturer has helped me become productive, thereby improving my performance' (Participant 02).*

Another student commented:

> *'I generally don't speak out as I am reserved. I doubt myself and my views or opinions of things' (Participant 03).*

Similarly,

> *'My performance took a knock when full-time remote studying was introduced; the only way things improved was because I had access to my lecturers' (Participant 07); 'I was easily distracted by minor issues, including my personal and school career, but that initial Teams consultation with my lecturer did wonders for me' (Participant 11);* and *'Perhaps the question to ask is whether students from advantaged families experienced the same struggles as the rest of us, or were they given access to lecturers during the lockdown?' (Participant 13).*

Moreover, students who mentioned that they did not have access to their lecturers felt disengaged. One student highlighted:

> *'Learning in an online environment which is foreign for people like me was intimidating; unfortunately, this meant that I was not engaged during the previous semester' (Participant 01); 'As a result of my lack of engage-*

> *ment, my exam results are a joke!' (Participant 04); 'Most of us are disengaged as we cannot consult the lecturer in her office; data and airtime are expensive, sometimes we don't have electricity, so what then do we do?' (Participant 06);* and *'I am not sure whether I feel disengaged because of my experience of the lecturers and institution, or because of online learning. Nonetheless, I am frustrated' (Participant 12).*

Finally, satisfaction emerged as a result of students' access to their lecturers. Moreover, it was noted in the frequency of the lecturer's communication with students and students' overall satisfaction with online learning, the university, and the curriculum.

> *'I am satisfied with how things are progressing in my learning' (Participant 01); I wouldn't change anything right now; I am satisfied' (Participant 04), 'Online learning has its challenges, but one thing I cannot fault is my lecturer's support' (Participant 05); 'The lecturer responds to my queries until I am satisfied' (Participant 06);* and *'I didn't think I would cope with online learning, but here we are … I have no complaints!' (Participant 07) (Participant 08).*

As another student posited:

> *'I have never had this kind of communication with a lecturer before' (Participant 09), 'She is always available to respond to my emails … she even went as far as giving out her cell phone number to the whole class' (Participant 12).*

Regular communication with the students was also indicated as a sign of the lecturer's satisfaction,

> *'The lecturer doesn't seem to mind that we all phone, SMS, or email her when we have queries' (Participant 14).*

It is evident from these responses that effective communication – both in practice and in teaching – is central for understanding and learning to occur. Based on the above, it can be said that although students had challenges with learning remotely or online, they were appreciative of their lecturers efforts

to maintain communication. This is in line with the communication channel element of the diffusion of innovation theory. For Rogers (2003:5), communication is 'a process in which participants create and share information with one another in order to reach a mutual understanding'. This communication occurs through channels between sources. In this case, the lecturers are the sources students look to for support and detailed communication.

In conclusion, Table 1 below summarises the advantages and disadvantages of integrating communication technology to foster an equitable curriculum for diverse students:

Students	
Advantages	**Disadvantages**
Engagement	Inadequate resources
Productivity	High data costs
Satisfaction	Technical challenges
Improved performance	Network-related issues
Creativity	Lack of lecturer access
Commitment	

Table 1: Advantages and disadvantages of integrating communication technology to foster an equitable curriculum for diverse students

This study aimed to explore the gravity of adopting communication technology for successful teaching in the post COVID classroom. The challenges highlighted above are not exhaustive; however, they highlight the challenges identified in this study that contribute to students' online learning experience.

5. Discussion

This study explored the gravity of adopting communication technology for successful teaching in the post COVID classroom. Data were collected from fifteen (15) students through online interviews. Ideally, the findings from this study could guide continuing research on the topic and enable individuals in positions of power to improve HEI policies and practices regarding the use and adoption of communication technology toward a more inclusive learning environment.

The findings of this study indicate that a student's learning impacts how that student may engage with their overall learning experience. Moreover, the study indicated that student engagement, productivity, satisfaction, improved performance, creativity, and commitment are the primary means by which a student becomes successful in their online learning. Motivation and effective communication on the lecturer's part further impact and influence students' interests and attitudes toward learning in an online environment (Duta, Panisoara & Panisoara 2015). While these lecturer attributes may not be foreign to lecturers, the study's findings suggest that the lecturer's ability to communicate effectively and regularly is essential across the curriculum – both in the traditional classroom and online learning.

In addition, the participants in this study also expected their lecturers to be creative in the online teaching environment and lesson delivery; this may be attributed to an understanding of the importance of student engagement. This finding could also be linked with the diffusion of innovation theory, as noted in this study. The need to be engaged in online learning could lead to the view that online learning should be 'diffused' innovatively or creatively to ensure that students have equal access and are not left behind. This phenomenon could help explain why engagement was one of the most predominant themes in all the interviews.

In addition, to achieve an inclusive learning environment, the study's findings suggest that HEIs, together with the government, should address the six challenges to online learning that were identified in the study:

- **Inadequate resources** – Students should be given adequate resources, such as laptops or tablets, to ensure an equal learning environment. Moreover, this will ensure that students have access to the resources required to aid them in their learning.

- **High data costs** – HEIs and the Department of Education should collaborate with mobile network operators to provide students with free data. This would enable students to attend online lectures and discussion forums, conduct online research related to their studies, and stay in touch with lecturers, ensuring that they are engaged, productive, and understand the curriculum.

- **Technical challenges** – Students should be provided with adequate training to ensure that they are tech-savvy and don't get left behind in the online learning environment. Although relevant for all students, this training would be particularly targeted at disadvantaged students who may have never been exposed to technology prior to commencing their studies.

- **Network-related issues** – Even prior to the pandemic, network-related challenges persisted. Still, students could access learning material or join online forums from their computer labs and/or campus residence. However, with students learning remotely, children learning online, and parents (and the general workforce) working from home, people relied more on their home internet connectivity. This increased internet usage and network overload, resulting in poor connectivity. Therefore, to address the network challenges raised, students should be provided with mobile network data in their residential areas that is stable. Moreover, they should be incentivised through the provision of additional data to conduct their research and complete assignments during off-peak hours when mobile networks are not as congested.

- **Access to the lecturer** – Students should have access to the lecturer to assist with course content/learning material, clarify questions, conduct follow-up lessons, and so forth. Moreover, the lecturer should ensure regular communication and endeavour to respond to students' queries within the stipulated timeframe to ensure engagement, productivity, satisfaction, and commitment. In addition, lecturers can facilitate engagement through various processes employed in the online learning environment to further encourage student creativity. Through interactions with students, lecturers can demonstrate the benefits of communication technology and the results of effective and timely communication, which are fundamental initiatives for fostering an equitable curriculum.-

Finally, as the study's findings suggest, adopting communication technology for successful teaching in the post COVID classroom is necessary for the context of curriculum equity and to achieve student engagement, pro-

ductivity, satisfaction, improved performance, creativity, and commit-ment. Moreover, to achieve an equitable curriculum through communication technology, it is suggested that HEIs familiarise themselves with the attributes that characterise an innovation (Rogers 2003). For example, the advantage of adopting a particular communication technology or innovation should be communicated, with possible examples highlighted. Second, additional channels outside the traditional communication methods should be made available for students to contact their lecturers for support. Third, students should be made aware of how the innovation may address or resolve some of their learning needs and challenges. Fourth, students should be trained on how to use the various available communication technology. Fifth, the innovation should be trialled with a sample before it is rolled out to ensure that it meets the needs of the students and HEIs. Lastly, it is important to measure the effectiveness of the innovation to ensure that it achieves what it intended, in this case, fostering an equitable curriculum.

6. Limitations, Implications and Conclusion

Data obtained in this study suggest that the fifteen (15) students enrolled in the two historically disadvantaged universities of technology had difficulty adapting to the online learning environment. Although studies that focus on online learning challenges exist, studies focusing on historically disadvantaged universities of technology in South Africa were not found. However, the results should be viewed considering some limitations. The sample size in this study is relatively small; it only includes third-year students of two historically disadvantaged universities of technology in South Africa. Students' perceptions at these HEIs may differ from those of students who study at public and private HEIs in South Africa or other countries. Consequently, the results may not be generalised beyond the two universities. Future research may extend the study to integrate comparative analysis of the perceptions of students and lecturers from different universities – both locally and at an international level. In addition, although online interviews provided the study with access to students from different locations, they are also limited because they lack the richness and spontaneity of face-to-face interaction.

The study also discussed the diffusion of innovation theory and how it can be applied in the adoption of communication technology to foster

curriculum equity in HEIs. Despite its shortcomings, the theory succinctly explains communication technology adoption and/or diffusion. However, additional theories on communication technology and innovation adoption should be considered for further studies.

Considering the study's findings, most students experienced a lack of engagement due to a lack of adequate resources, high data costs, network challenges, and lack of access to the lecturer. Some students from disadvantaged backgrounds found that their experiences differed from those of their peers at school. Thus, it is reasonable to believe that the need to be engaged in an online learning environment influences one's social behaviour, thereby impacting productivity, satisfaction, improved performance, creativity, and commitment. In addition, the findings highlight the importance of creating an equal environment where all students have access to the same technology in order to ensure that no one is left behind in the online learning journey. The results indicate that an urgent intervention is required from HEIs and the government to ensure equal learning opportunities and equal access to education by all. Through appropriate interventions, HEIs and the government could impact student engagement and participation, and overall learning success. Moreover, not only are students being prepared to excel in their assignments, but they are being prepared for success in a technologically-driven era and the future world of work upon successful graduation from their HEIs.

In conclusion, emerging and ever-changing technology clearly indicates that HEIs are far from being off the hook in preparing for learning post the COVID-19 era, affirming the importance of adopting communication technology for successful teaching and learning in the post COVID classroom. What is important here is the value this holds for HEIs.

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