

## Assessment of Challenges and Significance of Online Teaching and Learning

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### Abstract

*Humanity has witnessed centuries of technological advances, starting from the first industrial revolution, to what is presently called the technological revolution. From the discovery of radio waves to the invention of the first computer, wi-fi, and online databases, the fourth revolution, known as the technological revolution, has aided in the development of the remote working environment. The study has qualitative desk research as its foundation. A literature review is used to collect data, which is then assessed through document and conceptual analysis. The author is a participant observer who also adds personal experiences to authenticate difficulties encountered during Covid-19 when moving from high school to a university setting with more demanding technological challenges. The article aims to highlight the importance of online teaching and learning, to demonstrate the downsides that may also follow thereof, and to discuss the involvement of Artificial Intelligence in the academic and professional environment.*

**Keywords:** Artificial Intelligence (AI), Covid-19, Digital, Fourth Industrial Revolution (4IR), Online Teaching & Learning, Qualitative

### INTRODUCTION

Who would have thought that a microscopic phenomenon, a virus, would overpower the mundane lives of human race? In March 2020, the Covid-19 made her appearance in South Africa, resulted in a situation whereby a national lockdown was announced. This entailed a chain reaction of manufacturing and construction industries ceasing all their activities, retail sector to operate in a restricted environment obligating health regulations that limited the scope of their businesses, international trade discontinuing, media and communication sector to surviving, businesses liquidating, and the cherry on top, a major financial crash and economic downswing.

South Africa joined the struggle of the Covid-19 pandemic in March 2020, that also had a negative impact on the academic life of students and educators, that is the core of this study. Due to social isolation from friends, the circumstance had an emotional impact on students and raised questions about their ability to continue their academic studies. Because of the transition from a vibrant academic environment to an online one, which created silos in students' lives, the phase was challenging, stressful, and became even more pressure driven. For some students who missed out on celebrating Valediction and farewell ceremonies, the wonderful matric years were also overtaken by Covid-19. For high school students, the world came crashing down when it was realised, they did be missing out on their sweet 16<sup>th</sup>, the blossoming social life would disintegrate, and that extra-curricular activities would be terminated. The same sentiments would have felt by university students who missed out graduation ceremonies and hence memories for life. Tragic. It took great willpower for students to have adapted to being in a home environment every day, to adjust to the lack of hobbies and to embrace the reality of remote learning. Further challenges were experienced by university students who were preparing to join the employment sector and were hit by the limitations as several companies were closed, new appointments were seized, and labour market was dealing with the adaptability issues with technology.

Furthermore, load-shedding reached advanced levels in South Africa, which put a great deal of pressure on students to keep up with their studies. When there was no electricity, students had to miss their online classes. Inverters were purchased, but they couldn't be charged for very long. Inability to concentrate on studies during exam times resulted in anxiety, stress, and even a mild form of depression. In this circumstance, it is possible

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to wonder how successful online teaching & learning interventions will be in the absence of infrastructure support.

On the other end of the spectrum, the experiences also demonstrate the importance of online teaching & learning for students' advantages and academic success. Based on the difficulties and important facets of online teaching & learning discovered through this study, recommendations are made to address difficulties and investigate the advantages of online teaching & learning.

The study also discusses the issue of artificial intelligence in the academic context, weighing the benefits and drawbacks for and against. For instance, the advantages of ChatGPT for improving critical thinking, data analysis, and decision-making among students, ethical considerations to be obligated to avoid negative outcomes, and most importantly, the means to safeguard the potential risks. Future research will advance this field.

## **LITERATURE REVIEW**

The section covers information on the status of digitalised communication prior to the emergence of Covid-19 and in the post-Covid era; benefits of online teaching & learning and disadvantages of the online processes in teaching & learning.

### **Digital communication pre-and during- COVID 19**

There is already a familiarity with Skype, Zoom, Google Meet, and their fellow competitors. Well, what do these brands have in common is that they are digital communication platforms developed for the purpose of connecting people across geography. Prior to the pandemic, there were many businesses who were already exercising the use of these digital platforms whereby their processes were digitally coordinated, and services were available online. Government ministries, departments and municipalities also had their websites to keep the communication channels operational that assisted the officials to run the operations smoothly when pandemic occurred.

And just like a company needs digital communication platforms to operate, some high schools also had a communication application called “D6 Communication”, in which they actively communicated with parents on school events, holidays, and critical news. When pandemic hit the country, Schools received a D6 Communications plastered a “red alert” message on everyone’s devices. “DISTANCE LEARNING ON BLACKBOARD COLLABORATE”. That day marked a pivotal point in online education.

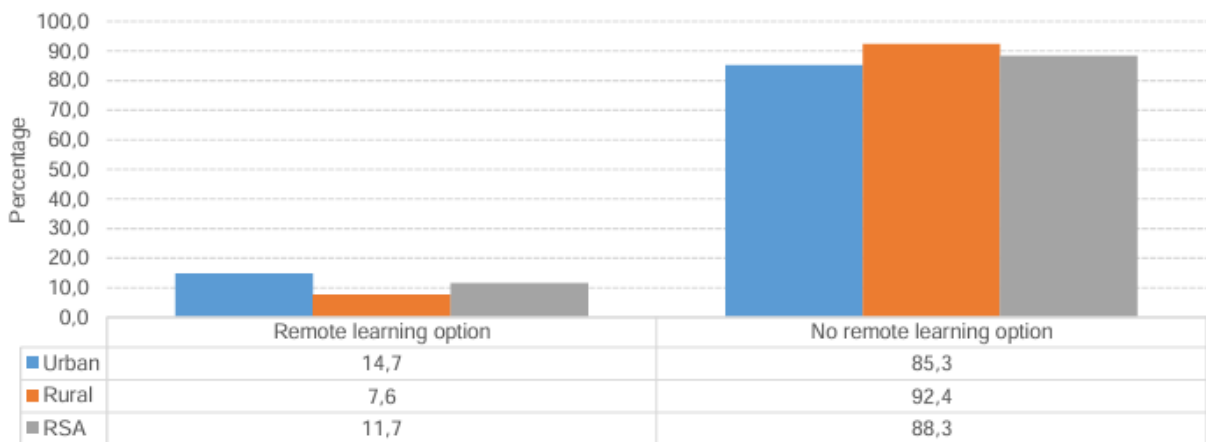
Almost 17 million students in South Africa, ranging from pre-school to secondary school, had their education interrupted when school closures were announced on March 18, 2020. The strict lockdown rules that were implemented had an impact on nearly 2.3 million students enrolled in post-school education and training institutions. The education sector was given new rules and regulations that included things like updating the curriculum, changing the mode of delivery, adjusting the academic schedule, implementing new teaching programmes, increasing health and safety precautions, and providing financial assistance and aid packages (Statistics SA 2022a).

It is a no brainer that Covid-19 introduced an emotional strain on the youth. Due to the social isolation from friends, peers, and fellow teachers, this circumstance raised questions regarding the ability of the youth to continue their academic studies. This statement is substantiated with the fact highlighted in the Statistics SA report (2022a) that even with the creation of remote learning programmes, student participation in the lessons was not assured. Only 11,7% of schools nationwide offered remote learning options, according to a recent Statistics South Africa report titled ‘Covid-19 and barriers to participation in education in South Africa, 2020’. This is recorded in Figures 1 and 2 shown below.



**Figure 1:** Percentage of individuals aged 5–24 years who attended educational institution/school that offered remote learning as a measure taken to contain the spread of Covid-19 virus in 2020 or home-schooling option, 2020

Source: Statistics SA 2022a.



**Figure 2:** Percentage of individuals aged 5–24 years who attended educational institution at which he/she is enrolled that offered a remote or home-schooling option by geography type, 2020

Source: GHS 2020, cited in Statistics SA 2002b.

Figure 2 shows that nearly four percentage points more than the national average (88,3%), the largest percentage of people aged 5 to 24 who attended educational institutions without remote learning options were found in rural areas (92,4%). (Statistics SA 2022b).

It is therefore imperative that before the discussion heads into the nitty gritty of online education and its accessibility, a distinction needs to be made between a hybrid curriculum, and a traditional face-to-face curriculum. From a private school's context, that followed International and National curriculum standards, investment in technological systems was made a priority for students. Information Technology (IT) was a compulsory subject on the timetable in many schools, where students were focused heavily on the understanding of basic software, such as Chrome, Microsoft applications, and general programming skills. It is because of this hybrid curriculum that the transition to Blackboard Collaborate went smoothly. Adapting to the tools available on the application was easy. Navigating through the world of online learning did introduce students to a world of benefits, but also to a realm of obstacles in the South African perspective.

However, the situation seemed more acceptable in private schools due to financial availability, but this is not always the case with government schools that struggle to cope with the demands of technology with lack of

infrastructure, laptops, technological-trained staff and load-shedding, discussed more in detail under challenges in proceeding sections.

### **Benefits and Advantages of Online Teaching & Learning**

Following the emergence of the Covid-19 pandemic, the idea of online learning gained popularity all over the world. Universities today have an obligation to stay abreast of the educational demands, needs, expectations, preferences, obligations and requirements of students because higher education systems in both developed and developing nations are continuously evolving, as emphasised by Pillay and Madrimure (2023). As supported by Coman, Țiru, Meseșan-Schmitz, Stanciu and Bularca (2020), universities thus see information technology and e-learning platforms as essential to conducting their operations, and they are investing a growing amount of money in digital platforms and devices (Coman et al., 2020). There is further evidence that the Covid-19 pandemic has changed how higher education institutions teach and learn, impacting how teachers and students interact (Mesuwini & Mokoena, 2024). As a result, institutions had to adopt and adapt to digitalised communication to maintain contact between students and educators; between academics and administrators; and between institutions and stakeholders. According to Henricksen, Creely and Henderson (2020), understanding that teaching needed to be adjusted to the new medium to ensure high-quality instruction—just switching from one medium to another—followed such transformations and innovations. It was supported by Coman et al. (2020) adding that newly defined roles resulted from the fact that educators and students needed to develop new interpersonal and technological skills in addition to their technological proficiency.

Although most people view online learning as an addition to traditional classroom instruction, it has become increasingly important for universities to continue to operate (Coman et al., 2020) in a digitalised, online manner. The same notion applies to schools as well as every educational sector that had gone through the same experiences of Covid and adaptation to online teaching and learning. According to certain studies, there are several benefits that come with online learning for both educators and students. These benefits include being student-centered, being simpler to adjust to, and being able to foster relationships with students by providing both synchronous and asynchronous resources like chat rooms, emails, and forums, as highlighted by Hlatshwayo (2020; Mesuwini & Mokoena, 2024). Internet technologies also make it possible to distribute content to numerous users at once. Furthermore, students have benefited greatly from online learning, which allows them to customise the process to meet their needs and learning goals. These benefits include control over the content and the amount of time spent learning, as further alluded by Anwar and Adnan (2020). This has brought creativity and flexibility in the educational processes, enhanced communication with students, created more consultation forums for detailed guidance on subject matter. All these benefits added to the positive outcomes of online teaching and learning experiences. Online evaluations are also conducted that guide educators regarding the strengths of the subject-related content, quality of handbooks and reading materials, and improvement gaps in online offering. All these means are benefiting students, educators and institutions to continuously improve the quality of online teaching and learning.

The ability to share information and upload documents in a variety of formats are just two features of online teaching and learning that support and nurture the learning-teaching process. Users can access the content at any time after submitting it because it is a web-based system, which eliminates the need for extra tools, suggests Raheem and Khan (2020). More specifically, online instructions have made it possible for universities all over the world to transform into globally recognised institutions of higher learning for the information age. In this instance, the availability of global education options has increased students' knowledge across a range of subjects (Landa, Zhou & Marongwe 2021).

### **Challenges and Disadvantages of Online Teaching & Learning**

Although there are various benefits of using online platforms for teaching & learning, there are still a few challenges that are causing hindrance and obstacles at institutional level, student-educator level and require strategies to improve the situation. Technology-related obstacles, including internet access, computers, and other gadgets (refer to Rashid et al. 2016) as some of the difficulties that prevent the successful and efficient implementation of online teaching and learning in a university setting. This statement is supported by Mesuwini and Mokoena (2024) emphasising that a slow internet network, a lack of technical expertise and support, and

login problems are just a few examples of the problems that have arisen due to technology. Aina and Ogebo (2022) corroborate this, agreeing that limited connectivity and lack of support for technology integration are obstacles to the shift to online learning. The results align with the findings of the Department of Higher Education and Training (DHET) (2017), which reports that the adoption of online learning is being impeded by the realities of information and communication technology (ICT) infrastructure, including operating systems, software, expenditure related to connectivity and connecting devices, inadequate technological infrastructure and support, and the advanced ability of lecturers/educators to use technology in their teaching methodologies.

Decreased student motivation, delayed feedback or assistance because educators are not always available when students need help during learning, or feelings of isolation because of classmates' physical absence were some of the difficulties identified, as stressed by Moyo (2023). A lot of students found it difficult to comprehend study and reading material in a distance mode; for instance, the use of students' internet cameras in synchronous settings caused them discomfort, according to Bedenlier, Wunder, Gläser-Zikuda, Kammerl, Kopp and Ziegler (2020). The authors (Bedenlier et al. 2020) related this to how students often see themselves in their new surroundings and how they are unsure of who can see them. In contrast to traditional settings, students in online learning environments also had more fragmented relationships with their peers and were less likely to receive social support (Bedenlier et al., 2020). In addition, several students reported increasing workload (Aristovnik, Keržič, Ravšelj, Tomažević & Umek 2020) that could lead to mental stress. Students found challenges in establishing virtual education, through internet and network availability, facility availability, learning planning and evaluation, and collaboration with educators and fellow students, all that could have negatively affected their study journey.

In the country-context, the environment for higher education is still threatened by historical social injustices, just like other facets of South African life, which makes it a contentious field with opposing ideologies and conflicting viewpoints, stresses Pillay and Madzimure (2023). It was difficult to make the transition to online instruction. Many academic institutions found it difficult to create workable and effective plans in time for the sudden shift to remote learning and teaching. Several concerns surfaced about the continuous delivery of excellent training and education, course redesign, learning resources, tool development, and timely and suitable evaluation of learning outcomes (Huang et al., 2020; Marinoni, Van't Land, & Jensen, 2020), as well as the availability of instruments to verify the caliber of instruction and learning conducted online (Liu, Chen, & Pugh 2021; Goh & Sandars 2020). Tsegay, Ashraf, Perveen and Zegegerish (2022) found that low levels of mental and physical engagement led to low levels of class participation, weak peer instructions, poor interaction between students and educators, low enthusiasm and interest in learning and gaining knowledge, and ultimately, inadequate learning or information acquisition in many South African universities.

One of the significant and unavoidable challenges to online teaching and learning in the South African institutions of higher learning was the existence of digital divide. Even though the country is moving towards adapting the Fourth Industrial Revolution (4IR) modalities to operate, there is still a divide amongst the ones who have access and the other ones who do not. Duplessis (2022) opines that many institutions were exposed by the rise of online learning however they were not prepared to adopt 4IR. Moyo (2023) added that it is crucial to emphasise that during the university closures, socio-economic disparities grew wider because low-income students were unable to access educational resources such as the Internet and educational technology, and there were insufficient physical spaces available for them to engage in remote learning from home (Moyo 2023). South Africa already has various socio-economic issues and disparities due to the extent of poverty and unemployment. When such a country was faced with Covid-19, these disparities widened and caused more inequalities, one of them is digital divide.

Hlatshwayo (2020) posits that a significant investment in ICT infrastructure had not been made by the South African government prior to the Covid-19 outbreak. Since their residences offered better study spaces and internet access, many students were forced to move out and were left on their own and experienced the lack of internet facilities back in their hometowns. Hlatshwayo (2020) goes on to argue that this meant that most Black children from low-income homes in both urban and rural areas would have to go to their homes with

limited or no access to communication infrastructure, networks or wireless links available. In a study carried out by Mesuwini and Mokoena (2024), primary data revealed that most participants also cited load shedding caused by inadequate electricity supply, and weak digital connectivity due to internet challenges, as barriers to participating in online teaching and learning. The findings are consistent with Karani and Waiganjo's (2022) observations that conducting online classes with inadequate internet access and power outages has been problematic. When the power goes out, network connectivity typically suffers. Due to ongoing power outages, some instructors and students have been facing challenges to connect, adversely hurting online teaching and learning (Makuna & Aloka 2020) and this challenge may still occur occasionally in a post-Covid era.

Other issues worth noting include workload and management of time effectively. The findings are consistent with those of Hondonga, Chinengundu and Maphosa (2021) and United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2020) where it is reported that due to concerns that it would increase their workload, lecturers/educators were hesitant to offer online course materials. Moyo (2023) and Mesuwini and Mokoena (2024) also stated that it became evident that creating presentation slides in advance was essential for online learning because a well-run online class depends on a shared document that links the instructor and students. Online classes were thought to be boring and disconnected from the students when there was no shared presentation.

## **METHODS AND ANALYSIS**

In essence, the study is qualitative. Qualitative research is defined as any study that generates findings without the application of statistical techniques or other quantitative methods, according to Strauss and Corbin (1990, quoted in Rahman 2016:103). It can be applied to research on human behaviour, emotions, and sentiments, as well as social movements, cultural phenomena, cross-border interactions, daily experiences, and organisational operations. This suggests that qualitative research, which deviates from statistics, incorporates diverse realities. Qualitative research employs multiple methodologies and adopts an interpretive, naturalistic perspective when examining its subjects (Rahman 2016:103). The information is compiled through literature review. A written document that gives a logically reasoned case based on a thorough comprehension of the current state of knowledge about an area of research is called a literature review, according to Machi and McEvoy (2012:4). The data was also gathered through document review. A framework for interactive method complementarity is provided by document review. Documents also offer further study data. Records offer a way to track development and change, and information and insights gained from them can be useful contributions to a knowledge base (Bowen 2009:27-29). If there are different drafts of a given document available, the researcher can compare them to see what has changed. Furthermore, and this is crucial, document analysis can be used to confirm results or validate data from other sources (Bowen 2009:27-29). The information was assessed through document analysis. All correspondence formats that could provide insightful information about the phenomenon being studied are included in the document analysis process (Molebeleli 2017:20). According to Creswell 2013 (in Nyikadzino & Vyas-Doorgapersad 2020:236), reviewing and analysing a significant volume of written content is part of document analysis. Additionally, conceptual analysis was also considered to analyse information. As per Hansen (2006:62), philosophical inquiry's research design is connected to conceptual or concept analysis. The goal of philosophical inquiry is to conduct research through the application of intellectual analysis. Hansen (2006:63) believes that for researchers, concept analysis may offer additional benefits. To begin with, concept analysis helps the researcher understand the basic properties of the idea. Furthermore, concept analysis helps define the nature, traits, and distinctions of the concept. The notion's causes and effects are finally determined by concept analysis.

## **RESULT**

Based on the literature review, it is deduced that education is the building blocks of knowledge, offers wider academic experience, and understanding of real-world problems. It aids in developing an educated society with transformative mind-set towards progression and independence. In the absence of education, society cannot develop, grow, evolve, advance or innovate for the future. To ensure the continuity of education, schools and universities across South Africa had to adapt their practices to online platforms. This transformative curriculum presents several benefits for students engaging in online education as explored in the study.

The online processes have improved efficiency in teaching and learning practices. There was a drift from drawing away from traditional classroom teaching environment that was mostly relying on blackboard (in some traditional or remotely situated educational centres) or power-point slides and transparencies, that now considered as entry-level evolution in classrooms. The time these tools were introduced, they assisted students to feel empowered and advanced as they were newly exposed to the use of technology in the academic environment. This foundational level of evolution is a landmark in educational system that still requires recognition to serve as a stepping-stone to a wider technological platform for advanced online teaching and learning methodologies. It assisted educators to move away from wiping blackboards to creatively prepare power-point slides with designs, graphs, pictures to enhance the depth and comprehensiveness of topics delivered. With time and innovations in technology, the online platform was also advanced to cater for hi-tech modes of teaching and learning that included incorporating videos due to internet access in classrooms. Students also experienced efficiency as online learning opened a new window for access to lecture videos, study materials, and electronically available newspaper articles, research projects, dissertations for students and educators. More resources became available to also advance the communication between students and educators using Blackboard and Moodle platforms and enhanced the value of education with availability of global content through access to google.

Online processes have also brought flexibility of time and attendance. Technology is available 24/7 and is not restricted to geographical locations. It allows flexibility to students who cannot travel far distances to attend classes. It also allows flexibility to download lecture videos and watch in a time convenient for students. The financial situation of many students changed negatively during Covid-19. To support families with daily food and necessities, most of students got engaged in labour market. This restricted them to physically come and attend classes and hence negatively affected their educational journey. However, due to online teaching and learning practices, these students managed to attend classes conveniently to complete their registered degrees. The country also faced electricity crisis that additionally restricted students to log in to attend classes and read recommended materials. The online platform also assisted students to download the lecture videos and reading materials that they could read offline. It also benefitted students to have their attendance in the class as their names appear during the online classes and digitalised attendance was recorded. This flexibility assisted the educational sector to survive the pandemic and sustained the continuity of sharing knowledge without creating gap-years for students.

It is important to note that even the schools and universities have resumed face-to-face classes, the online platform is still in use and offers additional benefits to students with flexibility of watching lecture videos multiple times, and download reading materials, and make notes on technological devices. Many institutions also upgraded their libraries with technological devices, and they are equipped with e-books and e-journals that students can have access using their student number. The students have access to global library as institutions are associated with publishers, and hence have unlimited knowledge database to gather information. Many institutions still using the online platform for assessments to keep students updated with technological benefits in teaching and learning. The assessments are also formatted to incorporate digital methods, such as create videos, short films, etc., that brings creativity in the scholarship of teaching and learning.

From the literature review, it can be deduced that with every pro comes a con. In a general sense, some cons of online learning include too much time allocated to watching videos, or reading materials online from digital books, meaning too much attention allocated to screen time. This may have an impact where too much screen time may cause dry eyes, mental fatigue and may have a negative impact on focus and concentration. With continuous involvement with a digital device may also create a feeling of isolation. On the other hand, online learning may have benefits and pros when offering continuity in education without creating year-gaps, especially witnessed during Covid-19. It is worth mentioning that challenges were strategically handled to ensure smooth academic continuity by education institutions. Universities now ensure to have adequate resources to house several technological facilities available to all students, such as free Wi-Fi, internet hotspots, computer labs, libraries with e-access to reading materials, and residences with internet access.

Along with all the benefits discussed, it is also important to discuss that the most significant challenge that requires continuous attention and corrective measures is the emergence of ChatGPT. It is an imminent threat to education and educational systems. Students and educators are all familiar with ChatGPT, that can cause an unethical approach to education if not applied with conscious understanding. With that said, the sole purpose of education is to engage in critical thinking. Students who rely on Artificial Intelligence (AI) tools bruise their ability to think outside the box. The heavy reliance on AI tools can hinder the foundational blocks and skills a student needs when furthering their education and careers.

The present scenario is that Covid-19 has calmed down, and students are again privileged to experience on-campus education without any obstruction. Technological advancement has prevailed following online education. Students, during lockdown, acquired a greater sense of connection with technology and more schools/universities have adapted the use of 4IR in their curriculum. As part of any degree, it has become imperative for students to polish their skills on technology. Technology can also be misused by students who can use ChatGPT to write assignments without any effort that negatively impact on their learning. Educational institutions and educators do organise workshops and guide students regarding the consequences of ChatGPT but also train them the manner the same ChatGPT can be used for educational purposes. Such workshops instill ethical values and equip students with technological demands with proper knowledge. Some universities also offer compulsory courses on 4IR and AI to develop technological understanding amongst students and prepare them for the labour market. When these students join the labour market, they are already equipped with the digitalised knowledge and aware of the ethical use of technology in their respective work environment.

The negative side is that there is fear caused by technologically advanced platforms and methodologies. 4IR has become a threat to businesses and industries, and the preservation of manual labour becomes endangered. Due to the complex nature of many professions, such as engineering, medical, accounting, companies have considered installing relevant field-based/professional-based/service-based software to boost their business/processes/products/services. But this also means that some jobs are in danger, as these systems can process transactions and perform services in a digitalised manner, requiring no human involvement. This is a matter of debate that may explore some aspects of pros and cons of profession-based technological use in businesses in future publications. However, it is equally important to note that 4IR is a way forward and technology is here to exist. It is important therefore to understand the ethical side of managing technology. Cybercrimes are increasing, and systems can be hacked and misused for personal and financial gains. Hence, updating knowledge and cyber awareness is significant and needs to be part of academic and professional assessments.

4IR opens a window for positive transformation of many professions. These tools allow personnel to deviate from the traditional systems of processes to newer competencies such as digital literacy, data handling, auditing software, and many more, all to help combat the threat of AI to the profession.

## **DISCUSSION**

There are many African countries that had adopted online teaching and learning methodologies and have success stories to share. It is not possible to include them all in one publication. The article therefore uses one country and believes that South African can consider the case study as a best practice under lessons learnt. The case study used is Egypt, a developing country, that has been establishing its information and communication technology (ICT) infrastructure since 1985, and it keeps on promoting it in education, particularly higher education, to encourage instructors and students to learn (El-Khouly 2018). Evidence points to the fact that Egypt's internet users expanded dramatically during the last six years, from 2013 to 2019, reaching roughly 51 million. 73.81% are tertiary students, and 44.3% use the Internet for educational purposes (El-Sayad, Md Saad & Thurasamy 2021). To meet the demands of students while also improving and developing the quality of higher education, the Ministry of Higher Education has concentrated on a strategy for digital change that has seen money directed into e-learning initiatives since 2004 (El-Sayad et al. 2021). It is considered that more strategic efforts, investments and funding were made available for institutions of higher learning in the country to be part of global development goals of quality education.



Following the coronavirus outbreak, numerous Egyptian undergraduates resumed their studies entirely online (Mahmoud & Mai 2020), using digital platforms offered by many Egyptian colleges and universities. An empirical study by El-Sayad et al (2021) demonstrates that the effort put by the Egyptian government in collaboration with the institutions of higher learning to invest in online learning and teaching offered some positive results. The study's findings show that students were content with their online learning experience, implying that incorporating online learning into the educational process would be acceptable to most students.

There are many aspects of good practices that South African can draw from the Egyptian case, based on the challenges that have documented in the country. Evidence indicates that staff training is a major concern for higher education institutions utilising e-learning approaches. In this case, it is important to prioritise improving university teaching processes through e-learning, rather than solely training lecturers/educators on hardware and software (Lembani Gunter, Breines & Dalu 2019). The significant part of online lectures is to offer courses in a well-balanced content, that have a mix of graphs, statistics, and theoretical understanding. Various media forms can be utilised to creatively develop course content, also with a mix of quantitative and qualitative data to look at a topic with a wider perspective. The required information is available on google and various online publishing databases that can assist educators to draw study material that is relevant, timely, and updated.

Landa, Zhou and Marongwe (2021) further suggest that the South African government must act rapidly to make online learning a realistic option, particularly for students in rural areas who require assistance to access online platforms of teaching and learning and get benefited from this relatively new learning experience. Students as well as instructors should receive training in technology and online abilities to learn. First exposures deserve special attention. Training minimises anxiety while increasing technical self-efficacy, which boosts motivation to learn online (Mpungose 2020).

The reality is that the world is moving towards advancing 4IR and it is time that South Africa learns from best practices and invest in technology that is now a present and future of the studies, professions, and businesses. The World Economy Forum (2018) defines 4IR as technological progress that redraws the boundaries between the digital, biological, and physical realms. According to Erboz (2017), the Cyber-Physical Systems, Internet of Things (IoT), Smart Factory, and the Internet of Services (IoS) are examples of 4IR components. Artificial intelligence, blockchain technology, cryptocurrency, robotics, 3D printing, quantum computing, nanotechnology, and biotechnology are additional components. During the outbreak, cloud-based programmes like Zoom, Google Hangouts, and WebEx allowed educators and students to complete their work from home. (Mudau & Sikhosana 2024) and can still be continuously utilised to receive academic benefits.

To remedy the problems associated with online teaching and learning presented above, some of the recommendations proposed in literature include the following:

- University lecturers need continual training and encouragement to improve their internet-based instructional skills (Mesuwini & Mokoena 2024).
- University lecturers should be given sufficient materials and resources to enable online learning (Mesuwini & Mokoena 2024).
- Furthermore, the government should prioritise the needs of rural learners by providing enough resources such as internet connectivity and ICT devices (Mukuna & Aloka 2020).

It can be noted that cloud-based solutions such as WebEx, Google Hangouts, and Zoom, which are components of 4IR can let teachers and students fulfil their responsibilities from home. Kayembe and Nel (2019) discovered that the educational system in South Africa is facing certain obstacles as it implements 4IR. The challenges include insufficient financing, facilities and the necessary skills for 4IR deployment. The instructors' problems include pedagogical adaptability, teacher development, and infrastructure for technological innovation. The 4IR allows education systems to engage with government and corporate organisations (Kayembe & Nel 2019, Mudau & Sikhosana, 2024). Therefore, given the potential, the 4IR needs universities to properly provide students with the required tools for innovation to solve current and future societal concerns.

## CONCLUSION

The article aimed to explore the fundamentals of online teaching and learning. Covid created a chain reaction of events, especially surrounding the technological implications in education and professions. Online learning has shown some drawbacks, but also major benefits. Many professions have nonetheless seen a positive impact surrounding their processes. With just enough training surrounding AI, various educational disciplines and professions will see an evolution in their processes, services and products.

The limitation of the study is related to desktop analysis of information. The topic is comprehensive and gathering primary information was impossible as it requires ethical clearances from schools and universities that are considered as time-consuming. Additionally, as the second author is still a university student, the challenge was also linked to finances as travelling to different schools and universities would have cost money and time that was not academically conducive. Online interviews could form part of the study, but applying and receiving ethical clearance would be another challenge.

It is equally important to note that quality education is part of sustainable development goals (SDGs). International recognition of the critical role that communication and education can play in facilitating and advancing efforts toward sustainable development, as well as the processes leading up to these, is provided by the UN Decade on Education for Sustainable Development (ESD). Education plays a pivotal role in bringing about transformation by altering attitudes, behaviours, and lifestyles, as well as boosting involvement in the creation and implementation of a sustainable world (Sarabhai 2005; Vyas-Doorgapersad 2011) requires innovation in teaching & learning to meet with the demands of the digitalisation. Moriarty (2018, in Mbatha & Vyas-Doorgapersad 2023) added that it is therefore part of SDG 4 that aims to enhance quality education. All governments, regardless of their political inclinations, and people everywhere recognize the value of education as a public good, regardless of their financial or cultural background. Progress is mostly propelled by it. None of the nations have developed without implementing universal education. The status quo of SDG 4 and related challenges in South African educational sector may form part of future studies.

The article started a debate on online teaching and learning methods and its pros and cons. Future studies may link the topic to certain educational discipline(s) and gather information to assess the significance of online teaching and learning from a discipline-based perspective. Future studies may also be based on qualitative desktop analysis and with time create a longitudinal database of information as a contribution to the scholarship of teaching and learning.

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