RESEARCH AND POSTGRADUATE SUPERVISION DURING THE CORONAVIRUS-19 PANDEMIC: LESSONS LEARNED

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ABSTRACT

The Coronavirus-19 (COVID-19) pandemic imposed new demands for conducting research and postgraduate supervision online. Face-to-face interactions between supervisors and research participants were limited. Consequently, there was heightened attention to the use of information communications technology (ICTs) to mitigate the disruptions. There is not much research on postgraduate supervision during COVID-19. This interpretative-phenomenological qualitative case study analysed innovative strategies that nine purposely selected supervisors reported to have used to manage postgraduate research and supervision during the COVID-19 pandemic. Data were collected through online open-ended questionnaires sent to the supervisors. The constructivist theory underpinned this study. Results showed that while the pandemic was devastating, academic institutions learnt many good lessons regarding leveraging digital technologies for postgraduate students' supervision. Innovative online supervision pedagogies were invaluable for both supervisors and students. Therefore, during the post COVID-19 era, supervisors must continue leveraging the use of digital technologies in postgraduate supervision to reduce costs and increase master's and doctoral students' throughputs and outputs.

Keywords: postgraduate supervision, Coronavirus-19, digital technologies, constructivist theory

INTRODUCTION

The highly unprecedented Coronarivus-19 (COVID-19), which broke out in 2020, forced universities across the globe to shut down (Mpungose 2020) to observe COVID-19 protocols, including social distancing and wearing of face masks to prevent the spread of infections. The impact of these closures disrupted many sectors of life, including the education system which had to switch from face-to-face to online mode, with serious consequences for the teaching-learning processes and management of research involving human subjects. Stiles et al. (2022) report that when COVID-19 unfolded, only research that had direct benefits for people infected

with the virus was permitted to continue face-to-face, albeit with stringent measures. Research with no direct bearing on COVID-19 had to continue online. Therefore, during the peak of the COVID-19 pandemic, researchers, including supervisors and supervisees, were forced to adapt to the "new normal" of research management and supervision (Corpuz 2021).

The switch to online platforms widened the digital divide, the gap between students who could access digital technologies and those who could not (Golden et al. 2023; Freeman et al. 2022; Stiles 2022; Mpungose 2020), with serious consequences for postgraduate supervision which had to be conducted solely online during the COVID-19 lockdowns. Coupled with the digital divide was the lack of face-to-face or social interaction between the supervisors and supervisees, supervisees and peers and supervisees with participants (Lokhtina et al. 2022; Yin et al. 2022), resulting in a loss of social networks. Diminished physical, social and psychological contact among these parties led to anxiety and stress for some students (Lokhtina et al. 2022; Yin et al. 2022; Allen et al. 2021). These challenges call for an investigation into the innovative strategies devised by supervisors to manage postgraduate research and supervision effectively during the COVID-19 pandemic to ensure that the momentum was sustained and that production of research continued unabated.

Abundant research has been conducted on the effect of COVID-19 on doctoral students' wellness and mental health (Lokhtina et al. 2022; Yin et al. 2022; Allen et al. 2021); social isolation (Pyhältö, Tikkanen, and Anttila 2022; Filho et al. 2021), as well as how doctoral students' productivity declined (Lokhtina et al. 2022; Lambrechts and Smith 2020), did not decline (Muschalla, Sondhof, and Wrobel 2022), or increased (Lindahl 2023; Jackman et al. 2022). However, there is a dearth of research on the effect of COVID-19 on postgraduate research supervision during this pandemic. The aim of this article was to analyse the innovative strategies that postgraduate supervisors in a Faculty of Education at a select university in South Africa employed to manage research and supervise students during the COVID-19 pandemic, with the goal of drawing lessons from them. The research question was: "How did postgraduate supervisors continue to supervise postgraduate students' research activities during the COVID-19 pandemic, and what lessons were learned?"

It is highly possible that currently, universities have adapted to the "new normal" of teaching and learning and postgraduate supervision and that lessons learned from the COVID-19 pandemic are likely to affect how these processes are carried out in the future. Therefore, university Postgraduate Centres, Research Departments, and postgraduate supervisors need to leverage the research-supervision strategies presented in this article as they pave the way for how research should be managed beyond the COVID-19 pandemic and in line with the 4th Industrial Revolution (4IR). The benefits incurred from the COVID-19 pandemic are likely to

sustain research supervision while simultaneously enriching students' experiences of support and success and increasing postgraduate research outputs and throughputs.

CONTEXT OF THE STUDY

This study took place at Faculty of Education at one of the four universities in Western Cape province in South Africa. Participants in this study were nine Master of Education (M.Ed) and Doctor of Education (D.Ed) supervisors selected from a Faculty of Education at the university in the province. Although this faculty offers other postgraduate programmes at Postgraduate Certificate Education (PGCE) and Bachelor of Education Honours (B.Ed Hons) degrees, the study focused on M.Ed and D.Ed research management and supervision because these two-degree levels are research-intensive. Before the advent of COVID-19, the expectation was for supervisors and supervisees to meet face-to-face every month and to communicate occasionally via electronic email (Email). However, as alluded to earlier, during the height of the COVID-19 pandemic, meeting face-to-face was restricted, thus putting a strain on the supervision and research-management models that students and supervisors were familiar with.

Like at other universities globally, during the COVID-19 lockdown, supervisors and supervisees could only meet online. Unfortunately, students without access to digital resources suffered due to the digital divide (Nkoala and Matsilele 2023; Reddy Moonasamy and Naidoo 2022; Dimitrov 2021; García, Weiss, and Engdahl 2020), thus challenging supervisors to devise innovative ways of accommodating them by using asynchronous multimodal online supervision MLSs such as Email, recorded materials, and WhatsApp text rather than synchronous ones, such as MS Teams, Zoom, WhatsApp video and voice, and Skype.

To improve postgraduate student support, outputs, and success, this Faculty of Education offers capacity development workshops to mentor and coach emerging supervisors and pair them with established supervisors. There are also supervisor workshops on managing postgraduate research through the university's Higher Degrees Committee (HDC) digital resource, a process used to monitor and evaluate students' progress and success based on HDC approvals. In addition, at this institution during the COVID-19 pandemic, different university units, such as the Centre for Postgraduate Studies (CPGS), Centre for Innovative Educational Technology (CIET), Faculty of Education, and other units offered a variety of capacity-development workshops for supervisors and students, including integration of technology in postgraduate supervision.

LITERATURE REVIEW

The literature review presented below will address two subthemes: Factors affecting

postgraduate research supervision and The role of technology in postgraduate supervision during the COVID-19 pandemic.

Factors that affected postgraduate research supervising during COVID-19

Postgraduate research supervision is about scaffolding (Vygotsky 1978) masters and doctoral students' learning to develop and produce quality theses. This is done through constructive feedback, which enables them to acquire critical research thinking skills and research presentation (Mullen 2020). According to Wisker et al. (2021, 614), postgraduate research supervisors "provide structure to generate clear goals and expectations, advice and factual information to plan and conduct research, and practical assistance and resources to teach and complete research tasks".

Several factors affect postgraduate research supervision in South Africa and elsewhere. Mahlangu (2021, 199) reports that the challenges of postgraduate research supervision include "lack of supervision skills, changing of supervisors, and the mode of supervision employed". While the supervision mentioned by Mahlangu included face-to-face meetings between students and supervisors before the COVID-19 pandemic, such research pedagogy was not possible during the high levels of lockdown in many countries, including South Africa. Teaching and learning, including research pedagogy, made use of educational technology to mitigate the loss of learning during the pandemic (Crompton, Chigona, and Burke 2023).

On a personal level, postgraduate research supervision, especially at the doctoral level, is usually considered an emotional venture (Doloriert, Sambrook, and Stewart 2012). This requires the supervisor and supervisee to develop trust between them and create time and space to discuss personal issues that may affect the progress of the research production. During the COVID-19 pandemic, emotional support for students and supervisors was even more essential than before (Cameron et al. 2021), because both parties experienced emotional exhaustion, stress, depression, and burnout emanating from COVID-related factors (Yin et al. 2022; Allen et al. 2021). Albertyn and Bennett (2020) contend that postgraduate students experience uncertainties when conducting research and that if these uncertainties are not managed well, they can negatively affect the process and quality of research. During the COVID-19 pandemic, it was even more essential for supervisors to understand their students' emotional, psychological and academic needs and to find ways to mitigate their challenges. In their study, Albertyn and Bennett (2020) identified supportive ways to contain and minimise students' uncertainties. A study by Charoensukmongkol and Phungsoonthorn (2020) reveals that supervisor support lessens emotionl exhaustion among employees. Postgraduate supervisors can leverage support for postgraduate students to minimise their emotional burden

and uncertainties.

The role of technology in postgraduate supervision during the COVID-19 pandemic

The adoption of ICTs for remote postgraduate research supervision has revealed both "challenges and opportunities" for the supervisors and supervisees (Adedoyin and Soykan 2023). For instance, it is not easy for online supervision to incorporate formal and informal face-to-face interactions and socialisation that yield to relationship-building and knowledge that enhance postgraduate students' and young researchers' scholarly identity development (Cheng and Song 2020). While video calls or online meetings like MS Teams and Zoom may to some extent mitigate some of these limitations, the lack of fast connectivity network and load-shedding made some supervisors helpless when trying to make up for the scholarly identity development of their supervisees (Crompton et al. 2023; Lasater et al. 2021).

Nonetheless, postgraduate research pedagogy during the lockdown required a paradigm shift in engagement strategies, where different types of digital devices and platforms were embraced to enhance research accessibility, data collection, and supervision. However, the supervisors and supervisees' technological knowledge and training determined how the digital tools were used for effective teaching and learning and how research processes were done (Mahlangu 2021). The postgraduate research pedagogy requires time and effort to manage the digital learning platforms for effective synchronous and/or asynchronous supervision (Kumar et al. 2020; Kumar and Johnson 2019).

On a much positive side, some researchers (Trevisan et al. 2023), have argued that because most learning had to move to online platforms, we can realise the affordances of educational technology on pedagogy beyond the COVID-19 pandemic. The researchers are of the view that "all areas of research can be performed much more swiftly and efficiently" while using online platforms (Sohrabi et al. 2021, 61). Such affordances include the development of "collaboration and speed" as elaborated below:

> "International research efforts, built on collaboration, have allowed for significant breakthroughs to be made regarding our understanding of the pandemic. The open sharing of knowledge and research efforts has stimulated global collaborative bonds with a common purpose. It is our hope that these will continue beyond the pandemic, for the benefit of both education and research." (Sohrabi et al. 2021, 61).

Indeed, the pandemic has made institutions of learning and individuals realise that educational technology has more to offer than what we knew before 2020. Although we are slowly going

back to the old norm, most of the realised affordances are revitalising educational technology.

THEORETICAL FRAMEWORK

Vygotsky's (1978) social constructivist theory undergirded this study. This theory portrays students as active participants in the process of knowledge construction. Students are not perceived as merely regurgitating knowledge from the teacher but as participating, with the teacher mediating the teaching-learning process through guiding and supporting them to reach potential development. In the context of supervision, this theory suggests that supervisees not passively wait for supervisors to "teach" them the ropes, but supervisors should facilitate the supervision process by scaffolding their learning in the zone of proximal development (ZPD). In constructivist learning environments, the teacher is a co-learner with students. The most knowledgeable other (MKO) who mediates students' learning can be a teacher, peers, siblings, parents, or anybody who can assist with the student's social and cognitive development.

Social interaction is integral in this theory because it is through communication and dialogue that the facilitator and learner can share knowledge and skills and co-construct new knowledge. When the learner has acquired the knowledge and skills to continue constructing knowledge on his/her own without support, the facilitator removes the scaffold by phasing out to allow the learner to construct the knowledge independently without support. This theory is relevant to postgraduate supervision in general and during the COVID-19 specifically, because the lack of social interaction among students, peers and supervisors meant that students had to actively engage in knowledge production and self-direct their learning. During the COVID-19 pandemic, with the supervisor merely providing guidance and support without spoon-feeding students. This is important because it promotes students' active engagement in the co-construction of knowledge and, ultimately, in them producing knowledge independently and autonomously without support.

RESEARCH METHODOLOGY

This qualitative case study comprised nine postgraduate supervisors. The paradigm was interpretative phenomenological analysis (IPA) by Smith and Osborn (2008). IPA is a double hermeneutic (Smith and Osborn 2008) in which the researcher tries to uncover participants' perspectives of how they make sense of and interpret their own personal lived experiences of the phenomenon under study. In this study, the researcher uncovered insider perspectives of the innovative strategies that supervisors used to facilitate postgraduate supervision during the COVID-19 pandemic and the lessons they learned based on their interpretations of their lived experiences. Data were collected in October 2022 through online open-ended questionnaires

sent to 21 Master of Education (M.Ed) and Doctor of Education (D.Ed) supervisors in the Faculty of Education at a selected university in South Africa. Respondents were asked to provide as many narratives as possible based on their lived experiences of managing research and supervising students during the pandemic. The sampling procedure was purposive, as the researcher assumed that postgraduate supervisors would be at a vantage point to provide rich data on the topic under investigation. Nine respondents, including five highly-established and four emerging supervisors responded to the questionnaire by providing rich narratives about their supervision experiences during this challenging period. Data analysis involved reviewing participants' responses and making sense of how they interpreted their experiences of supervising postgraduate students during the COVID-19 pandemic. Because data obtained revealed participants' varied experiences, the researchers colour-coded and grouped responses into different categories. After this grouping, colour-coded data were classified into emergent themes that are used to organise and present the results of this study.

Ethical considerations

Ethical issues were considered. The ethics application was approved by the Ethics Committee of the Faculty of Education in which the study was conducted. Participants signed a consent form that was attached to the questionnaire. The voluntary nature of the study was explained in writing for participants to understand that they were not coerced to participate in the study. Anonymity and confidentiality were explained in writing for participants to understand that instead of their real names, the codes S1–S9 would be used in reporting the results. They were also informed that the name of the institution would not be disclosed and that data would be stored in an external drive accessible only to the researcher and be destroyed after the article had been published.

RESULTS AND ANALYSIS

This section presents the analysis of the findings of this article based on the data collected from nine supervisors who participated in this study. This section is organized into four themes: Strategies Employed by Supervisors to Manage Research, Challenges Encountered by Postgraduate Students and Supervisors, Supervision Benefits during the COVID-19 Pandemic, and Lessons Learned.

Strategies employed by supervisors to manage research

Although they had not used online platforms for postgraduate supervision before the COVID-19 pandemic, it appears that participants were quick to adopt and domesticate the digital tools

following the training their institution had offered on how to integrate ICTs into their academic work. In the next section, the two recurring strategies that the participants employed to supervise postgraduate students and avoid loss of learning are presented, including Integration of digital technologies into supervision and Development of virtual communities of practice.

Integration of digital technologies into supervision

As stated earlier, following the challenges posed by the COVID-19 pandemic, higher learning institutions (HEIs) imposed remote learning to mitigate the loss of learning. Participants in this study adopted various innovative strategies to allow postgraduate students' research activities and supervision to continue, including the adoption of online platforms and tools such as MS Teams, WhatsApp, email, Google Meet, and Zoom. They reported that these tools enabled them to interact, share documents, and collaborate remotely with their students. S1 and S6, in separate incidents, described how they used these tools as follows:

> "My students and I used WhatsApp for emergency communication and for quick messages. We also used Google Meet when we needed to chat longer and share documents." (S1).
>
> "One-on-one online time was excellent. I would send feedback via email or WhatsApp (using voice notes), and then we would meet online on MS Teams for discussions." (S6).

From the two participants above, it is clear that the supervisors were committed to ensure they were able to communicate with their students so that they continue to progress with their studies. The supervisors and students adopted various ICTs for the supervision during the difficult time. According to Granić (2022, 9725), such adoption of ICTs is a "decision to make full use of technology innovation as the best course of action available". The participants perceived the use of the online platform to be innovative and enabling them to continue supervising during challenging times. There are advantages to combining different forms of communication when face-to-face supervision is not possible. For the students, receiving both written and audio feedback, as narrated by the participant above, supports a more in-depth cognitive presence than only one form of communication. Clearly, the multiple forms of communication afforded the students asynchronous feedback and reflection (Miller 2020).

From the observations above, the different types of technologies for different forms of communication enabled remote supervision to be effective. Wisker et al. (2021, 614) observed that this type of conducting supervision mitigates the "limitations of physical distance and is a viable alternative to impart knowledge" despite the constraints of time, space, and costs. Another advantage of platforms such as MS Teams is the possibility of screen sharing to have

mutually beneficial, intellectual dialogues synchronously (Wisker et al. 2021).

However, S9 and S5 acknowledged that it was challenging to navigate different digital platforms and manage appointments with their students. Kumar et al. (2020) also observed that supervisors needed time to understand different digital tools for online learning but also to spend time and effort managing such platforms. Ramos-Pla et al. (2022, 688) have also argued that although digital technologies can help innovate the supervision pedagogies, "careful planning is needed that leads to true transformation so that the digital tools are not only used as simple platforms that store content, but that also modify learning strategies" and the interactions between supervisors and supervisees. The supervisor and the students need to agree on the meetings, and since these would take place online where there is a lack of body language, they must ensure that there is trust between the two parties (Kumar and Johnson 2019).

Development of virtual communities of practice

Communities of practice (CoPs) are not new (Wenger 2004). Wenger (2004) explains that researchers, who in the context of this study are supervisors and postgraduate students, are in the best position to manage the knowledge they produce. Data analysis of this study showed that the supervisors developed and maintained communities of practice (CoPs) with their students and peers. Bozarth (2008 in Chigona 2013) defines CoP as a self-managed group of people with similar interests engage mutually to create shared learning. S2 surmised that during the COVID-19 pandemic, some supervisors adopted CoP as a supervision strategy where they mutually engaged with their students and colleagues.

Because the CoPs were conducted online, they were virtual communities of practice (VCoPs). According to Penfold (2010), VCoP is a virtual space in which members of a community interact and exchange shared knowledge and experiences. S7 explained how she implemented this strategy by establishing a team of two supervisors and three newly recruited post-doctoral fellows who had expertise in different aspects of the research topic. This is what she had to say: "I developed a team of supervisors for my three new doctoral students where we met online once a week from 4.00 p.m.–6.00 p.m".

Evidently, individuals with different skills and levels of knowledge on postgraduate supervision came together to form a VCoP that encompassed situated learning. Knowledge acquisition in this type of learning is unintentional rather than deliberate, and it takes place in the context where it is used (Lave and Wenger 1991). S7 further explained how this strategy benefitted both the students and the supervisors: "With the team of doctoral students – we have continued meeting weekly online, and this helps to maintain their interests in their theses".

Clearly, the supervisors were able to do things online that would have been difficult to do

face-to-face during the peak of the COVID-19 pandemic. The VCoPs that were formed were sustainable because the engagements took place online after hours. Djatmika, Prihandoko, and Nurkamto (2022) are of the opinion that online supervision and engagements can be possible at any time of the day. This makes it easy for supervisors and students to meet if concerted efforts are made to come together as a group online and share ideas. It is important to noete that, this type of virtual supervision has provided affordance of the "powerful learning potential of working sideby-side with other researchers as a means for doctoral candidates to develop research and technical skills, adopt identities as researchers, and become socialised as scholars in their chosen fields" (Wisker et al. 2021, 615). This means, even in the post-COVID-19 situation, the virtual communities of practice for postgraduate supervision would provide insightful sessions regardless of distance.

Challenges encountered by postgraduate students and supervisors

The COVID-19 pandemic posed several challenges for the postgraduate research management and supervision processes. Some of the challenges faced included Difficulty with data collection and Lack of face-to-face interactions.

Difficulty with data collection

One of the main challenges for postgraduate students was the difficulty of finding schools to collect data, especially for students who were conducting qualitative research; as S4 explained,

> "It was challenging for my doctoral and master's students to find schools to collect data for their theses because the principals did not allow them access to schools. I suggested to them that some of the interviews be conducted online."

Due to the lockdown regulation imposed on communities to combat COVID-19, it was not possible for researchers to meet their research participants face-to-face. Hence, it was not easy for them to collect good-quality data. In this case, both the researcher and participant required good quality gadgets and reliable network and Wi-Fi. While postgraduate students were provided with data bundles, they were not enough for them to complete the data-collection process. Consequently, their data needed to be augmented with supplies from their supervisors, which was not always possible because not all supervisors had funding in their research-subsidy accounts to support students. However, for some students and researchers, the use of digital tools to collect data proved to be convenient in terms of time and travel expenses when the respondents were from far away or in another province. This is in line with Sohrabi et al. (2021), who showed that research can be performed much more swiftly and efficiently using digital

technologies. This may imply that it may be less costly for students to collect data remotely than to travel long distances. Hence this method of collecting data may also be not time consuming which could yield in many students completing their studies on time.

Lack of face-to-face interaction

Another challenge was the lack of face-to-face interaction between supervisors and students, which could affect the quality of feedback and guidance. Nonetheless, S8 who took the risk of meeting students face-to-face expressed that: "I personally met with my students during the COVID-19 pandemic but made sure that social distancing was adhered to. I also communicated with them via e-mail and Zoom-meetings."

While S5 reported that supervisors and postgraduate students had access to data bundles for connectivity, she noted that others expressed that they still missed face-to-face meetings. This could be an indication that digital technologies can never replace the human supervisor. There is a lot that is lost in online supervision, for example, body language, which is believed to communicate rich information (Djatmika et al. 2022). It is, therefore, not surprising that S8 opted to combine online and physical meetings with students to enable social constructivism, which, according to Akpan et al. (2020), is the interaction and/or collaboration with others for effective learning outcome. This might explain why S8 took the risk of meeting with students face-to-face amid the COVID-19 pandemic to develop a social presence with students. This undertaking is in line with Williamson and Williamson (2020), who argue that cognitive engagement requires attention, presence, time, and possibilities to connect with role models in the field.

Supervision benefits during the Coronavirus-19 pandemic

The analysis of data revealed that the COVID-19 pandemic had several benefits for both supervisors and postgraduate students. S3 asserted that the COVID-19 pandemic forced them (supervisors) to adopt digital technologies in postgraduate supervision, which students found convenient, as it allowed them to participate in supervision at their convenience without worrying about spending money and time to access face-to-face workshops or meetings with supervisors. S9 as well mentioned that he found online supervision convenient, as he did not have to deal with students who failed to honor their appointments with him.

S8 and S4, who by university standards were emerging supervisors, mentioned that they found being paired with established supervisors beneficial to their growth and development. In particular, they spoke highly of various virtual workshops on postgraduate supervision, Turnitin, HDC Digital, article-writing and use of data-analysis software that the university

units, including the CPGS and the CIET organised for them. They further expressed a strong belief that it was due to the COVID-19 pandemic that these workshops had been offered to enhance postgraduate supervision and research outputs during a crisis period, as well as to drive the technology agenda among supervisors.

Participants also highlighted the benefits derived from collaborating on postgraduate supervision, as surmised by S7 as follows: "As a supervising team, we built on and extended each other's constructive critiques. This was invaluable for us, but mostly for our doctoral students who observed how we, as their supervisors, dealt with constructive criticism."

S6 perceived the strong bonds among supervisors and supervisors, supervisors and students, students and their peers, and supervisors and stakeholders in other units as having derived from COVID-19 pandemic. He explained thus: "Never before COVID-19 did I observe such unity, collaboration, cooperation and integration of services of all the organs of the university. Indeed, such bonding can only be attributed to COVID-19."

This bond was observable among the university organs, but also among students and peers as well, as advocated by S1, that, "As a result of COVID-19, the students developed a shared bond among themselves and would ask each other for help."

It should be noted that relationship between postgraduate students is crucial as Mason and Hickman (2019) show that peer support among postgraduate students support research productivity and successful completion of the studies. Wegener, Meier, and Ingerslev (2016, 2) that peer learning is crucial for making the "doctoral journey a less fearful and more joyful and constructive experience". While in normal circumstance doctoral students feel lonely as they pursue their studies because meeting with others is not easy due to time and distance constraints. the CoPs developed virtually during COVID-19 assisted students to interact and collaborate and bond. Such peer support and bonding is likely to enhances research productivity and successful thesis completions (Mason and Hickman 2019).

From the benefits above, it is clear that through collaboration and interactions in the supervision groups, doctoral students enhanced the knowledge and skills they needed to successfully complete their theses. This mutual growth and development confirm that cognitive development is a social and interdependent process (Vygotsky 1978). The novice supervisors were also able to acquire both tacit and explicit knowledge about supervision. Lunce (2006, 39) defines tacit knowledge as "knowledge which experts have developed over a long period of time, but which they may not be able to articulate to a novice. While tacit knowledge can be difficult to define and communicate, it is often an integral part of the culture or community of practice." The use of digital platforms and tools enhanced the construction of meaning and knowledge in the supervision encounters.

Lessons learned

The return of face-to-face teaching and learning in HEIs after the COVID-19 lockdown provides an optimal opportunity to reflect on lessons learned during remote postgraduate student supervision. Although the COVID-19 pandemic was devastating to many sectors, including higher education, it has forced academics to rely on and embrace digital technologies to continue research and postgraduate supervision (Ramos-Pla et al. 2022). S6 averred that supervisors developed innovative ways of supervision, which are perceived to be time-saving for both supervisors and students. Supervision online implies preparing learning activities to suit the digital tools and managing online communication and interactions to achieve the learning outcome (Ashour, El-Refae, and Zaitoun 2021). When participants were asked if there were any lessons learned from COVID-19, S3, and S9 mentioned that being forced by COVID-19 to use digital technologies for postgraduate supervision was an important lesson for them. The following response was from S3, who explained that,

> "I have completely changed my approach to supervision now. I feel I am much closer to my students and can keep tabs on them. In the past, there would be email correspondence and in-person meetings, which often did not happen because students 'disappeared'. Online is so much easier for them and for me."

Similarly, S9 asserted that,

> "I have learned that technology, if used effectively, can be a powerful tool for postgraduate students' supervision. It can cut the time and distance that can delay students' progress. ... a hybrid approach can be used so that students and supervisors alternate between meeting physically and online.

From the narratives above, it is clear that supervisors need to be available to support their postgraduate students with the research journey. Traditionally, however, due to distance and requirements to meet with postgraduate students physically to render the support was not always easy before the adoption of the online platforms that enabled remote supervision. In the post-COVID-19, it has been shown that "remote supervision transcends the limitations of physical distance and is a viable alternative to impart knowledge despite the constraints of time, space, and costs" (Wisker et al. 2021, 614). It is interesting to note that supervision has changed for the better following the adoption of online supervision. Indeed the combination of online and face-to-face supervision may have to be promoted considering that emotional communication is important which may not be the same when meeting is face-to-face than

online. The sharing of emotions remotely only may "intensify power and emotion dimensions" (Wisker et al. 2021, 614). Therefore, using a hybrid approach would ease challenges experienced when only one approach is used.

All the participants in the study commented that they will continue using digital platforms when supervising postgraduate students because that is working much better than before when they relied on only face-to-face meetings and email. Indeed, the move to remote teaching and learning during the COVID-19 pandemic showed academics that a hybrid approach to postgraduate supervision can be helpful in this digital era. Ramos-Pla et al. (2022) have shown that many instructional strategies employed during the pandemic were successful, and most of them are likely to be returned and complement the traditional face-to-face pedagogies.

DISCUSSION

In this study, supervisors were generally happy with the online supervision, as they realized many benefits for them and postgraduate students. One of those benefits was that the COVID-19 pandemic had compelled them to adopt digital technologies for supervision, which they and students found flexible and convenient. They also highlighted how COVID-19 gave rise to a variety of capacity development workshops, which were opportunities they believed they would not have obtained had the COVID-19 pandemic not broken out. They reported having maintained social interaction with supervisees through different technologies, which also allowed them to develop social networks in the form of VCoPs (Penfold 2010) in which learning, exchange of ideas, and constructive critiques occurred, thus reinforcing constructivist learning environments. It could, therefore, be argued that both digital technologies and VCoPs broke the cycle of social isolation, as it allowed a flow of communication among participants and supervisees and supervisees and their peers. It could, therefore be seen that these innovative strategies (digital technologies and VCoPs) facilitated dialogue, which is an integral part of constructivism (Vygotsky 1978). A similar view is held by O'Connell et al. (2022), that technology-facilitated socialization interventions and virtual socialization interventions (e.g., VCoPs) are essential for breaking social isolation among people.

Other authors as well have observed the benefits of using digital technologies in teaching and learning. Bennett, Maton, and Kervin (2008) argue that they address the needs of today's students who are digital natives, whereas Khoza (2019) surmises that they allow students to access course information anywhere and anytime, thus making teaching-learning flexible. Evidently, digital technologies were central to postgraduate supervision. Supervisors facilitated, supported, guided, and scaffolded postgraduate student supervision in constructivist environments (Vygotsky 1978) using digital technologies. In these environments, the

constructivist process was individual (between supervisor and supervisee) and shared (between supervisor and supervisees, among cohorts of supervisors and student cohorts, and between supervisees and peers). Therefore, the pivotal role that technology played in postgraduate supervision during the pandemic cannot be overemphasized. This makes it important for postgraduate supervisors and postgraduate research centers to leverage technology in postgraduate supervision beyond COVID-19 and in line with the 4th Industrial Revolution (4IR), as suggested earlier.

The use of VCoPs as supervision strategy cannot be underestimated, as it allowed people with similar interests (supervisors and students) to engage mutually to create shared learning (Bozarth 2008 in Chigona 2013). The technology used in VCoPs facilitated the sharing of knowledge and skills by supervisors and students in an enabling and non-threatening environment. According to the Early Childhood Professional Resource Centre (n.d.), CoPs provide a safe environment to build organic relationships. Because people share ideas freely without being judged, CoPs foster growth, a point highlighted by Lave and Wenger (1991) that it is through engagement with others in social settings that individuals' learning may be enhanced. In addition, because CoPs are not based on an expert model of knowledge delivery (Early Childhood Professional Resource Centre (n.d.), every member's knowledge counts. This non-judgmental setting facilitates dialogue among participants, which is consistent with the principles of constructivism. It is likely that the dialogic nature of the VCoPs fostered mutual relationships among supervisors and students and closed the void that the COVID-19 pandemic might have created among students, peers and supervisors. It is also likely that the VCoPs gave students a voice. Therefore, VCoPs were ideal for COVID-19 environments where social interaction was limited among supervisors and supervisees, and among supervisors and their counterparts.

Postgraduate supervision challenges encountered during the COVID-19 pandemic cannot be ignored. Supervisors reported how their students encountered challenges with data collection. Wolf et al. (2022) contend that COVID-19 mobilised researchers to adopt innovative ways of collecting data remotely. Furthermore, supervisors reported the lack of face-to-face interaction that affected the supervision processes, relationships between students and their peers and supervisors, and research productivity. According to Regala (2023, 4), "having an immersion face-to-face promotes better relationships among people, which in turn leads to productivity". This means that postgraduate supervision that takes place online only may have deprived the students of scholarly identity development (James and Lokhtina 2018) and of developing in constructivist environments where social interaction prevailed. Again, the dependency on remote supervision only may promote issues of power and emotion dimensions

hence disadvantaging the postgraduate students. Therefore, a hybrid approach whereby both traditional face-to-face and remote supervision methods may be used.

Results of this study demonstrated that the COVID-19 pandemic provided many learning opportunities and benefits for students and supervisors. The lessons learned and benefits engendered pave a way for if other pandemics break out in the future. In the context of South Africa, this includes student protests which often force universities to close indefinitely. Therefore, supervisors should leverage these lessons.

Limitations of the study

The study was conducted during COVID 19 and hence the limited methods used to collect the data might have limited the validity of the findings as it may not be the best to capture the experiences of supervisors during the pandemic. Face-to-face interviews could have been used to triangulate the findings considering that the non-verbal responses could not be accessed in the narratives provided by the participants in their responses to the open-ended questionnaire that was sent to them. Another limitation is to do with the small sample size used to collect data. This means there is limited representation of the global situation hence the results may not be generalisable.

CONCLUSION

Academic institutions were forced to work online during the COVID-19 lockdowns to mitigate loss of learning. In this study, supervisors constructed their own understandings of postgraduate supervision and developed techniques adapted to this situation. The use of digital technologies enabled supervisors to manage postgraduate students' research in constructivist environments that allowed students' supervision to be conducted individually and in VCoPs, the latter of which promoted collaborative learning. The VCoPs enhanced the knowledge and skills students needed to complete their theses successfully. Again, novice supervisors within the communities were able to acquire both tacit and explicit knowledge one needs to become a fleshed postgraduate supervisor. Individuals' learning was enhanced through engagement with others, making it possible for group members' capabilities to extend to a higher level.

In a nutshell, this study has shown that for the support of postgraduate students to be effective, the management of research and supervision requires a multi-dimensional approach in which all the organs of the university (for example, supervisors, faculties, and other university units) work collaboratively. It also requires leveraging of digital technologies to allow multiple perspectives of support for students, as revealed in this article that technology brought postgraduate supervision into the students' homes, thus allowing it to be flexible and efficient for students. Although the COVID-19 pandemic was devastating, academic

institutions have learnt many good lessons regarding digital technology integration into postgraduate students' supervision and research management. The innovative online supervision pedagogies reported in this article were invaluable for both students and supervisors during the COVID-19 pandemic. They are equally invaluable beyond the COVID-19 era, as postgraduate students continue to access research information and collaborate with peers and supervisors anywhere and anytime, thus making supervision flexible for both the supervisors and supervisees.

It is important to note that emotional communication between supervisor and postgraduate students is crucial in a thesis journey. Therefore, it is recommended that a combination of online and face-to-face supervision be promoted considering that emotions in a physical and virtual meetings may not play the same role. It is the responsibility of both supervisors and supervisees to manage the hybrid approach for supervision. It is also recommended that HEIs, postgraduate research centres, other university units and supervisors should leverage the use of digital technologies in theses production, as this will help to reduce costs incurred to conduct research and allow postgraduate students to complete their studies within the minimum time required, hence increasing master's and PhD throughput and outputs.

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