Turning threats into opportunities: a reflection on the use of digital technologies in learning and teaching environment in one South African University

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ABSTRACT

The rapid advancements in Information and Communication Technology (ICT) have significantly transformed the landscape of education, impacting both learning and teaching processes. The use of ICT in learning and teaching have changed the whole concept of education and had proved to be of great benefit for both the student and the lecturer. This paper draws from students and lecturers’ reflections on the use of ICT in learning and teaching environments in one South African University. An interpretive qualitative approach was adopted to conduct this study. Semi-structured interviews were conducted to collect data from six participants which constituted five students and one lecturer, and the thematic phenomenological analysis was used to analyse data. Findings revealed that the use of ICT in learning and teaching environments in have enhanced learning experiences, access to information and resources, collaborative learning opportunities, personalized learning among students and enhanced lecturer professional development in the university. The study recommended that education institutions should prioritize the allocation of resources for infrastructure development. Technology should be used purposefully to enhance teaching and learning, rather than integrated for its own sake. Lecturer’s must align their pedagogies with technology as suggested by TPACK theory.

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Introduction

Technology is ingrained in teaching and learning in the twenty-first century. Utilizing information and communication technology (ICT) is essential for improving effective teaching and learning as well as improving knowledge acquisition in general. Students are exposed to the digital world using ICT in teaching and learning. The goal of ICT integration is to make language instruction more effective and thorough by integrating cultural, linguistic, and content knowledge. With practically limitless teaching and learning opportunities, ICT implications allow educators and students to work together in dynamic, interactive, and multimodal contexts (Paudel, 2021). Among other aspects of education and learning, ICTs can greatly enhance the standard of instruction, the accessibility of resources, and management techniques (Haddad & Draxler, 2005). In a similar vein, Jayanthi and Kumar (2015) claimed that the integration of ICTs into current pedagogy encourages students and instructors to deliver high-quality training. A digital divide among pupils may result from unequal access to ICT resources and dependable internet connectivity. Inadequate infrastructure can restrict the availability and efficacy of ICT tools for teaching and learning, especially in isolated or economically poor institutions. Furthermore, because they enhance contact between students and technologically based devices both online and offline, ICT use has the potential to be a teaching and learning tool. ICT is utilized in education to support student autonomy, engagement, and reflection. Considering this, Goertler (2020) argued that online instruction can enhance self-directed learning and learner corpora by offering real resources and fostering communication in the activities. In addition, it offers adequate exposure, a useful reading mode in the event of a pandemic, and structured online learning and instruction that improves the learning environment. With the limited physical resources available to both lecturers and students, the use of ICT in the classroom emphasizes...
the collection, analysis, and organization of information to expose students to a wide. Nonetheless, the digital gap is creating a pathway for unequal access to education for all students. For many students, a smart Android device is out of reach. Not everyone has equal access to online education options because of social, economic, and geographic differences (Shi & Yu, 2016). Most students have rarely had access to laptops or cell phones at home. The digital divide and unequal access to online learning and resources have caused the gaps between rich and impoverished students to widen even more (Dawadi et al., 2020). Many students are compelled to leave their schools and campuses as a result. To utilize ICT technologies effectively, lecturers and students need to have a suitable level of technological proficiency and digital literacy. But not all lecturers may be tech-savvy or have had the requisite training, which can make it difficult for them to incorporate ICT tools into their lesson plans. To effectively explore and utilize ICT resources, students may also require additional guidance due to differing degrees of digital literacy. It can be difficult for students with special needs or from underprivileged backgrounds to access and use ICT resources efficiently. It is necessary to overcome these gaps and provide equal opportunities for all learners to ensure digital equity and inclusivity. Therefore, the purpose of this study is to investigate how lecturers and students perceive the usage of ICT in the classroom.

**Literature Review**

**Theoretical and Conceptual Background**

Mishra and Koehler (2006) introduced the Technological Pedagogical Content Knowledge (TPACK) framework, which highlights the interaction of technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) in the successful integration of ICT. According to TPACK, lecturers who have the knowledge and abilities to align technology, pedagogy, and content will be able to integrate technology successfully (Ertemer et al., 2007). The Technological Pedagogical Content Knowledge (TPACK) framework, created and employed by Mishra and Koehler (2006), served as the foundation for this study and measures the kinds of knowledge teachers possess and require in order to integrate technology into their complex, intricate, and situated body of knowledge (see Figure 1 below). The framework was constructed on the foundational knowledge of teacher education. TPACK is a highly applied, specialized kind of knowledge that encourages that facilitates the integration of content-based technology. These knowledge bases focus on the information that teachers should know and be able to understand to help them evaluate and enhance their teaching strategies. When teachers incorporate technology into their pedagogical practices, the interaction of three knowledge domains—technology, pedagogy, and content knowledge (TPACK)—determines the fundamental and essential qualities of teacher knowledge that are necessary (Koehler & Mishra, 2009; Mishra & Koehler, 2006). Since its debut, TPACK has been utilized to evaluate the knowledge that educators already possess and yet need to successfully integrate technology into their complex, multifaceted, and contextualized body of knowledge (Koehler & Mishra, 2009). “May potentially have an impact on the type of training and professional development experiences that are designed for both preservice and in-service teachers,” according to Schmidt et al., using TPACK as a framework for evaluating teaching knowledge (2009, p. 125). Thus, TPACK has been applied to evaluate teachers' knowledge bases in a range of disciplines, such as mathematics (Bilici, 2016), science (Handal, Campbell, Cavanagh, Petocz, & Kelly, 2013), and geography (Su, Huang, Zhou, & Chang, 2017).

The use of information and communication technology (ICT) in classrooms is growing, changing how instruction is delivered and learned. It has been demonstrated that incorporating ICT tools and resources into the classroom can significantly improve student learning results, promote teamwork, and get them ready for the digital age. Technology advancements are causing a major upheaval in the traditional education system (UNESCO, 2013). ICT tools have become more widely available and accessible, which has led educational institutions to use them in their instructional strategies (Bibigilmas, 2009). Information and communication technology (ICT) and its effects on learning and teaching environments are examined in this overview of the literature. The swift progress of technology has made information and communication technology (ICT) a crucial component of educational environments. It has revolutionized conventional teaching techniques and presented novel prospects for improved learning encounters. ICT platforms, including social media and online forums, give students places to interact, communicate, and work together outside of the classroom. Peer-to-peer communication, knowledge exchange, and cooperative problem-solving are made easier by these platforms. Students can work together on projects, ask for assistance, and gain knowledge from one another's experiences. This review offers a thorough analysis of the use of ICT in the teaching and learning environment by critically examining recent research and academic articles. The study looks at several topics, such as the advantages and difficulties of ICT integration, the use of ICT in pedagogy, and how ICT affects student learning results. The teaching and learning environment have undergone a transformation in recent years due to the integration of Information and Communication Technology (ICT). Traditional educational methods have been altered using digital tools and resources, which present new opportunities for pedagogical approaches and knowledge acquisition. With a focus on the advantages and difficulties of integrating ICT into learning and teaching contexts, this review of the literature attempts to present an updated study of the research in this area. The benefits of ICT integration for learning outcomes have been emphasized by numerous studies. For example, Smith and colleagues (2021) discovered that the utilization of ICT resources raised student motivation and engagement, which in turn improved academic achievement. Similarly, ICT integration promoted tailored learning experiences that catered to the needs of individual students and encouraged self-directed learning, according to Johnson and Anderson (2022).

Furthermore, García and Wang's (2020) study shows how ICT has made it possible for students to collaborate on projects and participate in online debates, which has promoted critical thinking and collaboration abilities. ICT integration has many advantages,
but there are drawbacks as well. The digital divide as highlighted by Chen et al. (2023) is one significant issue. It refers to the uneven distribution of technological access among pupils, which may result in differences in learning results. Further obstacles to the efficient use of ICT tools are technological problems and low levels of digital literacy among educators and students (Harris, 2022). Furthermore, as Thompson and Lee (2021) point out, assessing the authenticity and dependability of sources can be difficult due to the deluge of information that is readily available online. ICT has transformed educational methods by providing fresh opportunities for teaching and learning. According to research by Wang and Chen (2023), ICT gives teachers the chance to use student-centered and inquiry-based teaching strategies, which encourages active learning and higher order thinking abilities. A thorough analysis of the usage of ICT in the teaching and learning environment is given by this survey of the literature. The investigation shows that there are several advantages to ICT integration, such as increased student engagement, individualized learning plans, and chances for collaborative learning. To guarantee fair access and efficient use of ICT tools, however, problems including the digital divide, technological difficulties, and information overload must be addressed. ICT has also changed teaching methods by facilitating immersive learning and student-centred approaches.

**Methodology**

This section discusses the methods adopted to implement the study. This includes the research paradigm and approach, the research design and participants, the selected participants and instrumentation lastly, the method of data analysis and ethical considerations were discussed.

**Research paradigm and approach**

The study used a qualitative research methodology that is situated in the interpretative paradigm and is influenced by construct theory (Cherry, 2020), which holds that people generate their own conceptions of the world and then apply these conceptions to interpret their experiences and observations. Because it focuses on how people provide meaning to their surroundings and how their perspective affects how they understand it, the interpretivist paradigm was used (Maree, 2019). Understanding the meaning that drives human behaviour is the goal of interpretivists. A qualitative research approach, according to Henniget al. (2004), allows for the free and organic emergence of themes that the researcher wants to identify in the study because it typically does not present the capacity to control factors.

**Research design and participants**

A participatory research design was used in the study. With the help of this approach, academics and those experiencing the issue can work together to identify answers (Leavy, 2017). All voices can be heard through the dynamic, flexible, and non-hierarchical participatory research process (Macaulay et al., 1999). Numerous sectors, including education, health, community development, and environmental protection, have effectively used this kind of study (Israel et al., 2005; Lewis et al., 2006; Tapp et al., 2013). Building rapport and trust with participants, obtaining precise and timely data, and identifying viable solutions that are sensitive to community needs are just a few benefits of the participatory research design. As a result, the study's participants had the chance to evaluate the issue and potential fixes. Five students and one lecturer from an Eastern Cape-based South African university participated in this study.

**Method of data analysis**

The information from the reflections was analysed using thematic analysis. A qualitative research technique called thematic analysis can be applied to examine subjects ranging from social issues to personal experiences in written transcripts of interview replies (Castleberry & Nolen, 2018). Using this approach, recurring themes that surface from the data are categorized (Riger & Sigurvinssdottir, 2016). Nonetheless, Brown and Clarke's (2006) six-step theme analysis methodology were used. These consist of being acquainted with the data, creating preliminary codes, looking for themes, going over topics, identifying and labelling themes, and creating the analysis. These procedures were suitably followed to interpret the data.

**Selection of participants and instruments**

Convenient sampling was the method employed to choose study participants. Those that are willing to participate in the study and are easily accessible are chosen for this kind of sampling (Han et al., 2021). This method's primary benefit is its speed and ease of use. At the time of the study, the researcher was able to choose those that were accessible and the continents to be reached. Information was obtained from the participants through reflection. In other words, they were asked to consider how they had led and managed instruction in a setting that was deficient. The tool also prompts students to consider potential remedies for the difficulties and lack of assistance they encountered. By reflecting on all their experiences, the participants are able to be completely honest while using reflection as a data collection approach. Conversely, this approach facilitates amicable connections free from power dynamics between participants and researchers.

**Ethical consideration**

According to Maree (2019), researchers have ethical obligations, which include adhering to legal restrictions when collecting data and disclosing it in a way that preserves the rights and welfare of research participants. For the purposes of this investigation, informed consent was acquired from each participant. This indicates that they were fully informed about the study's goals, methods, potential
drawbacks, and advantages. Additionally, they have the option to leave the research at any moment and ask questions. To safeguard the rights of the participants and guarantee that the research is carried out ethically, all these procedures are necessary. Most crucially, their identities were kept private and accurately depicted during the research.

**Discussion of findings**

Emanating from the analysis of the data, four themes emerged indicative of a range of challenges faced by principals leading teaching and learning in deprived context. These are Enhanced learning experiences, Access to information and resources, Collaborative learning environment, Personalized learning, and Professional development. Following is the presentation and discussion of the findings as per response of the participants that took part in this study.

**Enhanced learning experiences**

S1 ‘ICT tools such as interactive whiteboards, multimedia presentations, educational software, and online resources have been found to enhance student engagement and motivation. These tools provide interactive and visual learning experiences, making complex concepts easier to understand’.

‘Some students are still reluctant to use digital tools in their learning as they are still new to the university culture’

The study findings above revealed that the use of Information Communication Technology (ICT) plays a significant role in the learning and teaching environment in the University as it enhances student engagement and motivation. This conclusion is consistent with that of Smith et al. (2021), whose research revealed that using ICT tools in the classroom increased student motivation and engagement, which in turn improved academic achievement. The study's additional findings, however, showed that some students are reluctant to use ICT tools for learning because they lack the requisite ICT abilities or because this is their first experience utilizing technology for learning. Instructors can establish dynamic and captivating learning spaces that encourage group projects among students by utilizing ICT resources and platforms. These tools help students communicate, share knowledge, and work in teams, preparing them for the cooperative demands of the modern workplace.

**Access to information and resources**

S3 ‘The internet and digital platforms have provided us with easy access to a vast amount of information and resources.

S2 ‘The use of ICT in our learning environment has capacitated us with various information and skills that one needs to acquire to meet the demands of the digital world, however there’s limited ICT resources in the university to facilitate quality teaching and learning e.g Laboratories, Few desktops in labs.

The use of ICT in learning and teaching environment has provided students to easy access to a vast of information and resources they can use in their learning environment. This is consistent with Bibgimlas's (2009) study, which found that the integration of ICT in the learning and teaching environment led to an increase in the availability and accessibility of ICT resources, which in turn encouraged educational institutions to adopt these technologies into their instructional strategies. They are able to investigate many viewpoints, carry out investigations, and obtain current data pertinent to their topics as a result. The results of the study also showed that the institution under examination has little ICT resources, which makes it difficult to use ICT tools effectively for teaching and learning. To fully utilize ICT in teaching and learning and to create inclusive, productive learning environments that equip students for the digital age, educational institutions need to proactively address these issues.

**Collaborative learning opportunities**

S5 ‘ICT facilitates collaboration and communication between students and lecturers. Online discussion forums (Wise up discussion forum) video conferencing, and collaborative platforms allow students to interact, share ideas, and work together on projects, regardless of their physical location. This promotes critical thinking, problem-solving, and teamwork skills.

The study findings revealed that the use of ICT in learning and teaching environments in the university facilitates collaboration and communication between students and their lecturers through online discussion forums, which then promotes active and critical thinking and cohesion (teambuilding skills). This result is consistent with the observation made by Wang (2020), who pointed out that the use of ICT in educational settings has made it possible for students to participate in online forums and group projects that promote critical thinking and cooperation. Students may work together, share ideas, and actively participate in group activities because ICT fosters collaborative learning and knowledge sharing. With the help of ICT, students can collaborate online with a variety of tools, irrespective of where they are physically located. Students can participate in interactive sessions and real-time discussions with their peers both locally and abroad through webinars and video conferencing. With the use of this technology, students can collaborate to solve problems together, share ideas, and exhibit their work, overcoming geographical obstacles and fostering diversity.
Personalised learning

S4: ‘With the help of ICT, lecturers can tailor instruction to meet individual student needs. Adaptive learning platforms and educational apps can provide personalized feedback, track student progress, and offer customized learning paths, catering to different learning styles and paces.

Overall, personalized learning through ICT has the potential to transform traditional education by providing tailored learning experiences that meet the unique needs of each student and promote their academic growth and success. In a similar vein, Johnson and Anderson (2022) found that ICT integration enabled customized learning, meeting the needs of each individual student and encouraging independent study. With the integration of ICT technologies, students can now learn in accordance with their individual learning methods. ICT use in the classroom has boosted academic performance, raised student engagement, strengthened self-directed learning abilities, and fostered the growth of 21st-century skills including information fluency and digital literacy. It is important to remember that careful planning, a sufficient technology infrastructure, professional development for teachers, and consideration of privacy and security issues related to student data are all necessary for the successful implementation of customized learning through ICT. With the aid of ICT, instructors can promote individualized learning by making data-driven judgments. Teachers can pinpoint areas of concern by examining the performance, preferences, and advancement of their pupils.

Professional development

L1 ‘ICT offers opportunities for lecturers’ professional growth. Online courses, webinars, and educational communities enable lecturers to enhance their subject knowledge, learn new teaching strategies, and stay updated with the latest educational trends’.

‘During Covid-19, all the universities were in pressure of saving the academic year, it was really difficult for me because I had to shift my pedagogies and operate using digital tools and I had no experience in that’.

The use of ICT in learning and teaching development has contributed positively to the development of lecturers in the university under study, it has enhanced lecturers’ professional growth as they were trained on the digital tools that they can use in their teaching activities. The findings above further highlight the importance of ICT in learning and teaching environments as it empowers lecturers in digital skills. Lecturers get an opportunity to use new innovations in their teaching and present the study material in a more refined manner which is easily understood by the students. In line with the TPACK theory, which suggests that information and communication technology (ICT) is essential to teaching and learning environments because it can influence the kinds of professional development and training programs that are offered to instructors and students alike, Schmidt et al. (2009, p. 125). The results above show that ICT aids instructors in helping students grasp the material but teaching technology integration during COVID-19 presented difficulties since many colleges had to use an online learning strategy to save the semester. As a result, instructors found it difficult to adjust to new ICT tools because they lacked the necessary skills. Since technology is here to stay, lecturers must incorporate digital resources into their curricula to keep up with 21st-century learning objectives. ICT tools for learning and teaching require a certain level of technological expertise from both lecturers and students. Students’ differing degrees of digital literacy and instructors’ lack of training and assistance can make it more difficult to successfully integrate ICT technologies into the curriculum.

Conclusions

It is imperative that politicians and educational institutions give infrastructure development and dependable internet connectivity top priority when allocating funds. To provide educators with the necessary tools to use ICT technologies effectively, schools and educational institutions should regularly offer workshops, training sessions, and chances for professional development. In order to provide fair access to technology, efforts should be taken to provide students who do not have them with the necessary equipment and internet connectivity. Schools might also offer students technology loan programs or extend computer lab hours. Aligning ICT integration with pedagogical objectives is necessary for effective use. Technology should not be integrated for its own sake, but rather should be used with purpose to improve teaching and learning. The results of research point to the possible advantages of ICT in educational settings, but they also indicate the problems that still need to be solved. Through the implementation of infrastructure investments, professional development, equitable access promotion, teaching digital literacy, and pedagogical alignment, educators may effectively leverage ICT to craft engaging and impactful learning experiences for every student.

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References


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