International Journal of Educational and Psychological Studies (EPS)

Volume.13, Issue.6 pp: 1105-1118

Dec (2024)

Article 10

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Accepted قبول البحث	Revised مراجعة البحث	Received استلام البحث
2024/10/8	2024/8/7	2024/6/18

DOI: https://doi.org/10.31559/EPS2024.13.6.10

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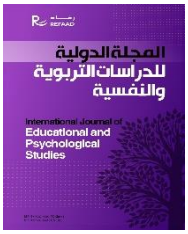
International Journal of Educational and Psychological Studies (EPS)

المجلة الدولية للدراسات التربوية والنفسية

Journal Homepage: https://www.refaad.com/Journal/Index/3

E-ISSN 2520-4149 | P-ISSN 2520-4130



Exploring the Benefits and Challenges of ICT Interventions on Teaching and Learning at Midlands State University

استكشاف الفو ائد والتحديات لتدخلات تكنولوجيا المعلومات والاتصالات في التدريس والتعلم في جامعة ولاية ميدلاندز

Abstract:

Objectives: This study explored the benefits and challenges of ICT interventions in teaching and learning at Midlands State University.

Methods: A qualitative research approach based on the interpretivism research philosophy was employed by researchers, in addition to a case study research design. Researchers conducted face-to-face interviews with a sample of twenty purposively chosen individuals using a semi-structured interview guide. This qualitative research study employed the inductive thematic data analysis method.

Results: The investigation uncovered that ICT resources can improve service delivery in the host organization. However, there was a paucity of learning/teaching resources and tools (data and computers for both students and lecturers). Many participants expressed concern that there was no sufficient support for learners and educators to use ICT tools effectively.

Conclusion: University management was advised to prioritize investments in teaching and learning technology to ensure effective service delivery as per the institution's mandate. To conduct a thorough analysis of the problem, future researchers can utilize the mixed method and associated research designs such as embedded, convergent parallel and sequential exploratory/explanatory. Particularly, the utilization of diverse data collection methods would assist in achieving credible outcomes.

Keywords: *Exploring; ICT; interventions; learning; teaching.*

الملخص:

الأهداف: بحثت هذه الدراسة في الفوائد والتحديات لتدخلات تكنولوجيا المعلومات والاتصالات في التدريس والتعلم في جامعة ولاية ميدلاندز.

المنهجية: استخدم الباحثون نهج البحث النوعي المستند إلى فلسفة البحث التفسيرية، بالإضافة إلى تصميم دراسة الحالة. أجرى الباحثون مقابلات وجهًا لوجه مع عينة مكونة من عشرين فردًا تم اختيارهم بشكل هادف باستخدام دليل مقابلة شبه منظم. اعتمدت هذه الدراسة النوعية على أسلوب تحليل البيانات الموضوعي الاستقرائي.

النتائج: كشفت الدراسة أن موارد تكنولوجيا المعلومات والاتصالات يمكن أن تحسن جودة تقديم الخدمات في المؤسسة المستضيفة. ومع ذلك، كان هناك نقص في موارد وأدوات التعليم/التعلم (مثل البيانات وأجهزة الكمبيوتر لكل من الطلاب والمحاضرين). وأعرب العديد من المشاركين عن قلقهم من عدم وجود دعم كافٍ للمتعلمين والمعلمين لاستخدام أدوات تكنولوجيا المعلومات والاتصالات بشكل فعّال.

الخلاصة: تم نصح إدارة الجامعة بإعطاء الأولوية للاستثمارات في تكنولوجيا التعليم والتعلم لضمان تقديم الخدمات بشكل فعّال وفقًا لتفويض المؤسسة لإجراء تحليل دقيق للمشكلة، يمكن للباحثين في المستقبل استخدام المنهج المختلط وتصميمات البحث المرتبطة به مثل التصميم المدمج، الموازي المتقارب، والتصميم الاستكشافي/التفسيري المتسلسل. بشكل خاص، سيساعد استخدام طرق جمع البيانات المتنوعة في تحقيق نتائج موثوقة.

الكلمات المفتاحية: استكشاف؛ تكنولوجيا المعلومات والاتصالات؛ التدخلات؛ التعلم؛ التعليم.

1 Introduction

From a development standpoint, education in society is of great importance. The benefits of education in society are supported by research findings (Hačatrjana, 2018). Significantly, tertiary schooling is linked to high-paying employment opportunities and public health, among other significant advancement indicators (Borawska-Kalbarczyk *et al*., 2018; Daniela, 2018). As a sovereign nation, Zimbabwe recognized the economic importance of academic success to its citizens through technology. Žogla (2018) hinted that Information and Communication Technologies (ICTs) are now considered innovative means of enhancing academic performance. Importantly, Zimbabwe established a national ICT policy in 2005 to enhance educational technology across the country's schools (Mandiwanzira, 2015). Similarly, the use of ICT for societal improvement and education is supported by civic institutions in Zimbabwe (Mandiwanzira, 2015). As a result, the study on the benefits and challenges of ICTs on pedagogy at Midlands State University was motivated by the researchers' positive perception of their transformative potential.

While ICTs have a positive impact on the educational experience, some academic staff at Midlands State University do not fully incorporate them into their course content creation or teaching. Many times, learners complain about receiving handwritten course notes and delayed feedback for continuous assessments. Furthermore, corporate organizations are questioning the diligence of some students seeking industrial attachment places who cannot analyze data using modern software. Prior research on the same subject, conducted in different schools (Gyamfi, 2017; Laura de Bruine, 2020; Youssef *et al*., 2022) did not provide an adequate explanation for the phenomenon. Hence, this research study aims to gain insights into the benefits and challenges of ICT interventions in teaching and learning at Midlands State University. Eventually, the research aim gave rise to the following research questions:

- What are the benefits of ICT interventions to teaching and learning?
- What are the challenges of ICT interventions on teaching and learning?

The individuals within the host organization contributed the necessary data to address the questions posed. The obtained outcomes could notify policymakers and leaders of the host organization about the importance of inclusive information and communication technology (ICT) policies in a university environment. Furthermore, the research candidates would acquire valuable skills for teaching and problem-solving in society. This article is divided into four main sections: the introduction, methods, results, and discussion and conclusions.

2 Literature Review

Researchers identified two supporting theories (constructivism and diffusion of innovation theories) to achieve theoretical triangulation (McCombes, 2023). Following that, an empirical evidence literature review at the international, regional, and local levels is presented. Finally, the subsection concludes by identifying research gaps and proposing strategies to close them.

2.1 Constructivism theory

Constructivism is a learning theory that suggests knowledge is most effectively acquired through reflection and active construction in the mind (Mascolo & Fischer, 2005). As a result, knowledge is a shared understanding among individuals. The student should consider the information being taught and draw upon their past experiences, personal beliefs, and cultural background to form an interpretation. Constructivism is divided into two main camps: radical and social. According to the first form of radical constructivism, the construction of knowledge is influenced by an individual's interpretation of their active experiences. According to the second form of social constructivism, human development is influenced by social interactions, and knowledge is created through collaboration with others. There are three key figures in the field of constructivism. Jean Piaget aligns with the radical constructivism perspective. Lev Vygotsky, in contrast, emphasizes the social dimensions of learning through shared experiences. John Dewey finds himself in a position where he can understand and support both perspectives, and he has numerous ideas that align with each side. The shared belief among these psychologists, who formed the constructivist movement, was that the existing learning theories, such as behaviorism and humanism, failed to accurately depict the true

nature of learning. Furthermore, their ideas were influenced by their classroom experiences rather than experiments conducted in a laboratory (compared to behaviorism). The importance of constructivist learning theory lies in its ability to guide educators in selecting appropriate methods for adult learning (Robbins & Judge, 2012). Through the comprehension of the fundamental principles of this theory, educators are prompted to adopt teaching approaches that facilitate knowledge construction, such as leading group discussions and learning through observation. Teachers must be knowledgeable about the learners' past experiences to facilitate their learning. Along with professional lessons learned from this theory, it also has empirical backing from previous published works (Ayaz & Sekerci, 2015; Bada & Olusegun, 2015; Cetin-Dindar, 2016).

2.2 Diffusion of Innovation Theory

The diffusion of innovation theory, created by E. M. Rogers in 1962, is one of the oldest social science theories (Rogers, 2003). It originated in communication to explain how, over time, an idea or product gains traction and spreads through a specific group or social network. The outcome of this diffusion is that individuals, as part of a social system, embrace a new idea, behavior, or product (García-Avilés, 2020). Adoption within the context of this theory means that a person engages in something in a different manner than what they had done before. This is typically achieved by either buying or using a new product, or by acquiring and practicing new behaviors. The key to adoption is that the person must recognize the idea, behavior, or product as novel or innovative for the diffusion to take place. The adoption of a new idea, behavior, or product does not occur simultaneously in a social system, but rather it is a gradual process where certain individuals are more inclined to embrace the innovation than others (Rogers, 2003). Scientists have discovered that individuals who embrace an innovation at the outset possess distinct qualities compared to those who adopt it later (Mkhize *et al*., 2016). When trying to introduce an innovation to a specific group of people, it is crucial to have a clear understanding of the characteristics of that group that may either facilitate or impede the adoption of the innovation. There are five recognized adopter categories, and while most of the general population tends to fall in the middle categories, it is still crucial to comprehend the traits of the target population. When marketing an innovation, various approaches are employed to cater to the distinct preferences of the different adopter categories.

Innovators - these are individuals who are eager to be the pioneers in embracing innovation. They are adventurous and open-minded, always eager to explore new concepts and ideas. These individuals are highly open to taking risks and frequently pioneer the creation of innovative concepts. Not much effort is required to attract this demographic.

Early adopters- these are individuals who act as opinion leaders. They have a passion for leadership positions and eagerly embrace opportunities for change. They are already conscious of the necessity for change and are at ease when embracing new concepts. To persuade this group of individuals to embrace innovation, it is important to provide them with clear and concise procedure manuals and essential information files that can guide them through the implementation process.

Early majority- these individuals are not typically leaders, but they tend to embrace new ideas before the general population. However, they usually require proof that the innovation is effective before they are willing to embrace it. To capture the attention of this demographic, it is important to highlight success stories and provide evidence of the innovation's effectiveness.

Late majority- these individuals are hesitant towards change and will only embrace an innovation after it has been widely accepted by the majority. To attract this demographic, it is important to highlight the number of individuals who have already embraced the innovation and have experienced positive outcomes.

Traditionalists- these individuals are resistant to change and hold conservative views. They are highly resistant to change and pose the greatest challenge in gaining their support. To attract this demographic, it is important to utilize strategies such as presenting statistical data, employing fear appeals, and leveraging the influence of individuals within the other adopter groups.

The stages by which a person adopts an innovation, and whereby diffusion is accomplished, include awareness of the need for an innovation, decision to adopt (or reject) the innovation, initial use of the innovation to test it, and continued use of the innovation. There are five primary factors that impact the

adoption of an innovation, and each of these factors is present to varying degrees in the five adopter categories.

- Relative advantage: The extent to which an innovation is perceived as superior to the existing idea, program, or product it replaces.
- Compatibility: How well the innovation aligns with the values, experiences, and needs of the people who might use it.
- Complexity: The level of difficulty in comprehending or utilizing the innovation.
- Triability: the degree to which the innovation can be tested or experimented with prior to making a firm decision to adopt it.
- Observability: The degree to which the innovation yields tangible outcomes.

2.3 Limitations of Diffusion of Innovation Theory

There are several limitations of the diffusion of innovation theory. Firstly, it does not encourage active involvement in the adoption of an innovation. Secondly, it is more effective to adopt new behaviors rather than stop or prevent existing behaviors. Thirdly, it fails to consider an individual's available resources or social support when adopting a new behavior or innovation(García-Avilés, 2020).

2.4 The justification for employing diffusion of innovation theory

Diffusion of innovation theory is a widely recognized framework that helps us understand how new ideas, technologies, or practices are adopted and spread within a social system. Applying this theory when conducting a study on the benefits and challenges of ICT interventions on teaching and learning in a tertiary institution is justified for several reasons:

- Innovation: ICT interventions, such as e-learning platforms, digital resources, and online tools, represent a fresh approach to teaching and learning, making them an innovation deserving a study.
- Adoption: the adoption process is a crucial aspect of understanding how teachers and students embrace and incorporate information and communication technology (ICT) interventions into their teaching and learning practices. A tertiary institution like Midlands State University is a complex social system that has its own unique culture, norms, and communication channels, making it an excellent setting to apply the DOI theory.
- The key elements of the Diffusion of Innovation Theory, such as relative advantage, compatibility, complexity, trialability, and observability, can be utilized to comprehend the adoption of Information and Communication Technology (ICT) interventions.
- Relative advantage: Does the use of information and communication technologies (ICT) improve teaching and learning?
- Compatibility: does ICT align with the current teaching methods and principles?
- Complexity: how user-friendly is it for teachers and students to utilize ICT?
- Trialability: can ICT be experimented on a small scale before being fully implemented?
- Observability: can the advantages of ICT be seen and shared among colleagues?
- Stages of adoption: the stages of adoption (knowledge, persuasion, decision, implementation, and confirmation) can assist researchers in comprehending the progression of ICT adoption among lecturers and students. The theory of diffusion of innovations acknowledges the significance of change agents, such as innovators, early adopters, and opinion leaders, in promoting the adoption of new ideas or practices. In a tertiary educational institution, these change agents can be identified and examined.

Researchers utilized the diffusion of innovation theory to investigate the factors that impact the adoption and effective utilization of ICT interventions in education, to develop strategies for successful implementation and integration. Additionally, there are research studies (Mkhize *et al*., 2016; Aivazidi & Michalakelis, 2022) that show how the diffusion of innovation theory can be used to explain how technology is adopted and used in tertiary education institutions.

2.5 International Perspectives on ICT interventions into teaching and learning

Failure to properly invest in ICT tools normally negatively affects students' academic achievement in educational institutions (Youssef *et al*., 2022). Bish (2017)elucidates that educators are responsible for no implementation of technology in pedagogy. Therefore, stern measures should be taken to educate and persuade responsible stakeholders to see the success of ICTs in learning and teaching. Moreover, the findings of Timotheou *et al*. (2023) exhibit that the incorporation of digital technologies is a complicated and ongoing process that affects various individuals and groups within the school environment. In addition, it was noted that the integration of ICT in schools not only enhances students' academic performance but also influences various other school-related factors and stakeholders. Notably, during the recent COVID-19 pandemic that accelerated the use of digital technologies in education, many schools showed a lack of experience and low digital capacity, which led to widening gaps, inequalities, and learning losses.

2.6 Regional perspectives on ICT interventions in teaching and learning

Regionally, it was discovered that managerial superintendence is vital for the efficient utilization of teaching technology in educational institutions. In Ghana, (Gyamfi, 2017) it was discovered that shared leadership was the most effective leadership approach to effective ICT integration because it brought together all stakeholders who had a vested interest in ensuring success. In general, participants expressed positive attitudes toward ICT and recognized it as a necessary component of 21st-century teaching and learning. However, it was discovered that most of them were inept at using technology for pedagogical purposes. According to Laura de Bruine's (2020) research in Ghana and Sierra Leone, both countries have a poor learning environment that is barely interactive. The researcher (Laura de Bruine, 2020) classified the learning environment into three types. For starters, resources and tools are scarce. Second, existing teaching and learning communities do not function well. Third, there is a traditional method of teaching and learning that involves little interaction. In addition to a poor learning environment, the education system is not closely linked to the labour market and does not provide the necessary 21st-century skills. In South Africa, Mahlo and Waghid's (2022) study revealed that teachers' age, level of ICT literacy, social institutions (provincial e-learning policy and school ICT policy), infrastructure, and resources prevented teachers from converting capabilities into functioning.

2.7 ICT interventions in teaching and learning-the local perspective

A Zimbabwean study (Mangwaya, 2018) demonstrates that lack of teaching and learning resources, as well as teachers' negative attitudes toward ICT integration, are major contributing factors to slow integration. On the other hand, Tsakatsa *et al*. (2019) discovered that, while school principals had generally embraced ICT in their schools, they lacked proper ICT qualifications and were ill-equipped to deal with all issues that would result in meaningful interventions. Also, the researchers (Tsakatsa *et al*.,2019)found that school leaders lacked adequate ICT knowledge, and little was being done to address the situation through in-service programs. Similarly, another study(Zinyemba *et al*., 2021) discovered that learners and educators in most government institutions were unable to use online learning following the closure of schools during the COVID-19 national lockdown period because the country was not prepared for online learning.

2.8 Research patterns and gaps

The research on ICT interventions in teaching and learning has highlighted several important aspects. Researchers will explore some key findings and potential research gaps in this subsection.

2.8.1 Advantages of ICT Integration

ICT, which encompasses computers, the internet, and electronic delivery systems, is extensively utilized in education. It is evident that the effective use of information and communication technology (ICT) can improve the quality of education and establish connections between learning and real-life scenarios. Additionally, ICT broadens educational opportunities, enabling students to learn anytime and anywhere by accessing online materials and participating in teleconferencing classrooms.

2.8.2 Obstacles and impediments

The absence of adequate teaching and learning resources, coupled with negative attitudes towards integrating information and communication technologies (ICT), impedes progress. In addition, school leaders frequently lack the necessary qualifications in information and communication technology (ICT), which hinders the implementation of effective interventions. During the COVID-19 pandemic, schools with limited digital resources experienced increasing disparities and setbacks in learning.

2.8.3 Research Gaps

The cited past studies reveal the existence of time-bound and population gaps. Thus, current researchers saw it prudent to place this study in a different context to realize new findings and conclusions. Accordingly, the idea would add new knowledge to the already existing body of knowledge and eventually close the time and population gaps. Furthermore, research should explore effective strategies for overcoming barriers to ICT integration and investigate how to enhance teachers' ICT skills and address infrastructure limitations. Also, another area for research is to examine the impact of ICT on student learning outcomes and equity.

3 Methods

This section provides an overview of the research methods utilized by the researchers in this study. The procedures specifically include philosophy, research approach, and design, sampling method, data collection instrument and administration, trustworthiness issues, and data analysis (Cooper & Schindler, 2014).

3.1 Research Philosophy

This treatise is anchored in the interpretivism school of thought which emphasizes the subjective experience and meanings that are multiple and varied. Equally, this philosophy holds the worldview that meanings are constructed by humans as they engage with the world and, in doing so, humans are influenced by social and historical perspectives (Neuman, 2014). Researchers employed this philosophy because they were interested in detailed accounts of the influence of ICT interventions on teaching and learning as constructed by students and lecturers(Tsouroufli et al., 2021).

3.3 Research Approach and Design

A qualitative research strategy was employed due to its ability to generate a wealthy textual account of research subjects' experiences with technological interventions within the host organization. Qualitative research crystallizes the experience and interpretation of events by subjects with widely differing stakes and roles and gives voice to those whose views are rarely heard (Collins, 2010). In this case, students' and lecturers' views on learning and teaching using modern-day technologies can be heard.

Furthermore, researchers used the exploratory case study research design to understand participants' knowledge of instructional technology in teaching and learning (Yin, 2009). Likewise, the strategy draws support from similar context studies (Malliarakis *et al*., 2014; Patricia, 2018). The Malliarakis *et al*. (2014) study was about a computer programming course in which students were taught about how computer programs are structured. Equally, the current study was concerned with the usage of computers and other instructional technologies in the delivery of lectures at an institution of higher learning.

3.4 Sampling Method

A purposive sampling method was employed to select research subjects wherein twenty participants were chosen from the university teaching staff and students' population. This sampling method was chosen because researchers were interested in participants who had first-hand experience with instructional technology and learners who also had experienced teaching through various instructional technologies used within the host organization. Research (Casteel & Bridier, 2021; Hennik & Kaiser, 2022) reveals that a homogeneous study population and narrow objectives are some critical points in choosing the sample size in a qualitative study. Interestingly, sample size of twenty participants were found to be sufficient (ibid). It is against this backdrop that researchers in the current study were persuaded to choose a sample size of twenty participants.

3.5 Data Collection Instrument

The data collection tool used was a semi-structured interview guide with open-ended questions to help researchers establish a relationship with the participants. The first drafted data collection tool was subjected to scrutiny by the academic supervisor and the dissertation committee testing suitability to study and research objectives (Creswell, 2013). To review the data collection tool questions, researchers conducted a pilot case study. The major types of pilot studies are focus group interviews, projective techniques, and in-depth interviews (Pandey & Pandey, 2015). Borrowing from the aforesaid scholarly advice, researchers conducted focus group interviews before the main data collection. The focus group comprised five people who are staff members of the university but different from the actual population where the final data collection tool was administered. The five members were selected based on their convenience, accessibility, willingness to cooperate, and physical proximity (Bhattacherjee, 2012). Researchers then used the results of the focus group to improve the research protocol and the interview guide.

3.6 Data Collection Instrument Administration

Research permission and ethical clearance were sought and obtained from the University Registrar. Out of the abundance of caution of not interfering with the employer's production time, researchers conducted interviews with participants during tea and lunch breaks. Learners were also contacted during free periods in students' common rooms of their hostels for the data collection process. The data collection process was done over a period of a month, with interview sessions ranging from thirty to forty minutes per participant.

3.7 Ethical Considerations

This research considered ethical factors in several ways. Firstly, participation in the research was voluntary, and research participants had the right to withdraw at any time of their choice. Participants were thoroughly informed before the research commenced, and they were properly treated throughout the research process. Moreover, research participants were provided with consent forms before the research and signed as evidence that their participation in the study was voluntary and not coerced (Pandey & Pandey, 2015). Furthermore, the identity of the research participants was kept private and confidential. Interviews were conducted with the approval of the institution. Researchers maintained objectivity and presented the true research findings.

3.8 Ensuring the Trustworthiness of the results

Researchers adopted several techniques to ensure confidence in the collected data and the research methods undertaken. To form a strong support base for research findings, two theories (constructivism and diffusion of innovation theories) were used in this study. Research participants were given a pre-submission copy of the research work such that they could provide constructive feedback on the accuracy of the collected data. Eventually, all participants agreed to the findings as reported in the final document. Equally, interview research questions were rephrased to detect falsehoods in participants' responses. All the same, no suspect data was discarded since participants were genuinely willing to participate in the study. Also, researchers provided a detailed description of the study context, and research subjects and ensured transparency in data analysis to achieve transferability of results.

3.9 Data Analysis and Procedure

An inductive thematic analysis was chosen because it is compatible with various philosophical perspectives such as constructivism, post-positivism, and critical realism (Braun & Clarke, 2006). Consequently, to ensure constant interaction and immersion in the data, open and focused coding was done using the traditional approach of paper, color markers, and visual mapping (Maher et al., 2018). The analysis was done within a constructivist epistemology.

Step 1: Familiarization with data

The first author conducted a thematic analysis using Braun and Clarke's guidelines (Braun & Clarke, 2006). The first step in developing themes was to become acquainted with and understand the data set. The first author read the transcripts several times to familiarize himself with the data set and to see if there were any common answers.

Step 2: Generating initial codes

At this second step of data analysis, researchers employed inductive coding to ensure that the analysis was grounded in the data itself, rather than being influenced by preconceived notions. Coding of the transcripts to enable a better understanding of the data set was initiated by the first author (Caulfield, 2023). The first author then organized common codes into meaningful categories, narrowing the options for themes.

Step 3: Searching for themes

The next step was to generate potential themes, and this was done through express analysis of the coded data. Express analysis was done so that the themes identified would be more closely linked to the original data and reflective of the entire data set and this resulted in four themes.

Step 4: Reviewing themes

Finally, the first and second authors reviewed the themes and associated quotes to see if the themes had enough supported data (Brymer et al., 2021). Checks like too diverse themes and coherence of data in supporting themes were conducted as well. After a discussion, it was decided that the previous names did not accurately capture the essence of each theme, so these were updated and finalized.

Step 5: Defining and naming themes

At this stage, the researchers created and defined a narrative of each theme that was important to the study problem (Braun & Clarke, 2006). Three names of identified themes were brief and adequately descriptive (ibid). Two codes (Big classes and huge classes) were found to be overlapping between themes and no emergent sub-themes were identified between themes by the researchers. Finally, data extracts that illustrate key features and narratives of the themes to be presented in the final report were selected.

Step 6: Producing the report

This final step involves writing up the final analysis and description of the findings (Braun & Clarke, 2006). Some of the elements of this writing process had already begun through the processes of note-taking, description of themes, and selection of representative data extracts in prior steps. Researchers used both narrative descriptions and representative data extracts from participants' direct quotations. The discussion section broadened the analysis by relating themes to related literature.

Table 1: Coding Qualitative Data

Interview Extracts	Codes
Educators can work from home, able to deliver lectures in a short period and provide continuous assessment feedback instantly. The same applies to students, they can as well serve themselves from the comfort of their homes or offices.	❖ Work from home ❖ Easy lecture delivery ❖ Learning from home ❖ Continuous feedback
Quite a large number of learners do not have access to enabling gadgets and that jeopardizes their learning. Some learners come from rural remote areas where internet connectivity is a challenge. Educators lack access to data and specific computers. Requisite training on the use of teaching methods using technology is a missing link between old-schooled staff members and techno-savvy staff. Managing big classes online here is a big problem	❖ Lack of access to enabling gadgets ❖ Internet connectivity challenge ❖ Lack of training ❖ Big classes ❖ Learning jeopardized
Yes, we can use the university computer labs but there is no data provision facility and some of us do not have the proper gadgets. In some lecture rooms, we do not have functional whiteboards or projectors. This is compounded by the huge classes at the institution.	❖ No data provision ❖ Absences of functional whiteboards ❖ Huge classes ❖ Computer labs available ❖ Lack of work tools

Table 2: Turning Codes into Themes

Themes	Codes
THEME 1: Benefits of ICT interventions to teaching and learning	❖ Work from home ❖ Easy lecture delivery ❖ Learning from home ❖ Continuous feedback
THEME 2: Challenges of ICT interventions on teaching and learning	❖ Lack of access to enabling gadgets ❖ Internet connectivity challenge ❖ Lack of training ❖ Big classes ❖ Learning jeopardized
THEME 3: Lack of support system for the efficient use of ICT tools by learners and educators	❖ No data provision ❖ Absences of functional whiteboards ❖ Huge classes ❖ Computer labs available ❖ Lack of work tools

4 Results and Discussions

The semi-structured interview guide was the exclusive means of collecting data, and it was used to interview twenty research subjects. The interviews were conducted during tea and lunch breaks. Generally, this was done to avoid interfering with the time that employees would spend on production. The response rate during the interviews was a hundred percent. Primary data showed that there were more male research subjects than female research participants, hence 60% of the sample size were male and 40% were female. The research encompassed individuals from 20 to 63 years of age. For some of the (5 participants) subjects in the research, an undergraduate degree was the highest qualification. Seven (7) lecturers held a master's degree as the highest level of education. Primary data revealed that five (5) lecturers were Doctors, and three (3) lecturers were Professors. The chosen research subjects were beginners in the use of a computer (thirty percent), fifty percent had moderate skills in the use of computers and twenty percent of the participants were competent in the use of computers. Extant literature (Baruch, 1999) reveals that any response rate of sixty percent and above is acceptable to overcome validity issues. Male participants' dominance depicts the fact that ideas proffered by research subjects were drawn from a patriarchal system. The age groups covered resemble a clear representation of different age groups and their understanding of ICT interventions in higher education institutions. Therefore, such a broad coverage of different age groups would provide a good base of ideas useful for understanding and utilization of ICT strategies to deliver service. The interviewed participants had their qualifications corresponding to their job positions within the institution. Indeed, the host organization has highly educated staff but there is an indication of few doctors and professors. This is a cause for concern for such a big institution meant to serve the nation. More than half of the research subjects had moderate computer skills. Undoubtedly, such a revelation implies that the host organization would not successfully implement ICT interventions into its core business without equipping the supposed users of the tools first. Even though the organization was found to be using ICTs, researchers opine that the efficiency rate in the usage of same was low.

Two themes were identified as the benefits of ICT interventions in teaching and learning and the challenges of ICT interventions in teaching and learning.

Theme1: Benefits of ICT interventions to teaching and learning

Research subjects revealed the importance of information and communication technology resources. Generally, ICT resources can improve service delivery in institutions of higher learning. Accordingly, the participants averred that:

"ICTs assist both students and lecturers to improve their skills (1 Student Excerpt).

Information is disseminated to many people quickly. Permits research and creation of students' databases and confidentiality can be ensured through the use of secret codes" (2 Lecturers Excerpts).

Thirteen participants agreed that:

"Educators can work from home, able to deliver lectures in a short period and provide continuous assessment feedback instantly. The same applies to students, they can as well serve themselves from the comfort of their homes or offices during times of pandemic outbreaks.

Given the outbreak of the coronavirus, teaching would have been a nightmare without the use of modern-day technology. Now with the implementation of technology, most of the university business functions have been integrated into good fashion. Some hidden cost associated with doing manual work was eliminated. Synchronous communication with students was enabled and paperless learners' evaluations were made easy" (13 Lecturers Excerpts).

Four of the participants agreed that:

"Lectures can be recorded, and video lectures can be watched by students who fail to attend online lectures by the scheduled time" (4 Students Excerpts).

Primary data findings concur with a Ghanaian study which revealed that research subjects expressed optimism about the use of technology in modern-day service delivery (Gyamfi, 2017). Study findings were further buttressed by Timotheou *et al*. (2023) study which noted that the integration of ICT in schools not only enhances students' academic performance but also influences various other school-related factors and stakeholders. Participants' experiences such as utilizing technology for remote teaching, paperless evaluations, and recorded lectures align well with the diffusion of innovation theory, which outlines the stages of awareness, decision-making, initial use, and continued adoption. Overall, the findings align with the diffusion of innovation theory rather than contradicting it. In summary, the findings align with constructivism theory by highlighting the importance of active learning, social interaction, and the influence of prior knowledge.

Theme 2: Challenges of ICT interventions on teaching and learning

Research subjects accepted ICT challenges in service delivery by educators within the host organization. It was reported that:

"Quite a big number of learners do not have access to enabling gadgets and that jeopardizes their learning. Some learners come from rural remote areas where internet connectivity is a challenge (3 Students Excerpts).

Educators lack access to data and specific computers. Requisite training on the use of teaching methods using technology is a missing link between old-schooled staff members and techno-savvy staff. Managing big classes online here is a big problem" (5 Lecturers Excerpts).

Participants agreed that:

"The major drawback here is lack of training on the professional use of ICTs and high cost of data and shortage of money for the purchase of necessary computers with high processing speed" (10 Lecturers Excerpts).

"Learning from home had some family-related problems like attending to kids and a noisy environment and online threats like viruses and scams which can steal one's passwords" (2 Students Excerpts).

On the other hand, research subjects bemoaned the lack of appropriate support for the effective use of teaching and learning technology within the host organization. Five learners agreed that:

"Yes, we can use the university computer labs but there is no data provision facility and some of us do not have the proper gadgets and it is just hard to attend online lessons. The situation is exacerbated by incessant power outages.

In some lecture rooms, we do not have functional whiteboards or projectors. This usually disadvantages students who come late for the lecture because they must sit at the back of the class and the natural voice projection of some lecturers cannot be heard. This is compounded by the huge classes at the institution''.

All interviewed teaching staff at the institution agreed that:

"The university-provided data for online lessons was not sufficient enough and at times network challenges from the service provider were a stumbling block to service delivery. The great bulk of educators were trained in the use of online teaching methods and software. Work tools like laptops were supplied to willing lecturers through a loan facility, though not all members of staff benefited. In some of our, there were even no desktop computers and relevant data analysis packages".

The findings concord with Youssef *et al*. (2022) study in France which discovered a lack of modern teaching and learning technology training is affecting the performance of university students. The assumed positive effect of ICTs was not possible because of the absence of water-tight education policies and there was still a digital divide in France. Furthermore, a shortage of resources and resistance to change by educators was found to be doing a great deal of harm to the implementation of technology in educational institutions (Mangwaya, 2018).In some cases, heads of educational institutions embraced the technology, but the major

setback was a lack of appreciation, training, and material support (Tsakatsa *et al*., 2019). Laura de Bruine's (2020) study results in Ghana and Siera Leone are consistent with the primary data. It was found that the two countries had inadequate learning environments and lacked modern technological support for both educators and learners. Ultimately, there were three categories of problems noted: inadequate access to essential equipment, education, and teaching resources, as well as an outdated method of teaching and learning.

In summary, although the challenges do not directly disprove constructivism theory, they emphasize the significance of overcoming practical obstacles to successful learning. Constructivist approaches can assist educators in creating solutions that consider learners' active participation, social environment, and existing knowledge. Participants' experiences such as the challenges faced by learners without access to gadgets, educators lacking data access, and the high cost of technology fit well with the diffusion of innovation theory. The diffusion process involves awareness, decision-making, initial use, and continued adoption. Overall, the findings align with the diffusion of innovation theory rather than contradicting it.

5 Conclusion

Researchers explored the benefits and challenges of ICT interventions in teaching and learning in a state-owned university. The paper revealed the critical grandness of technological resources in higher learning educational institutions. However, research subjects lamented shortages of technological learning and teaching tools, and support challenges within the host organization. Accordingly, it was revealed that most of the learners did not have computers/tablets for learning purposes. Moreover, internet connectivity and lack of data were some of the challenges indicated by the participants. Eventually, such challenges affected their learning patterns. Furthermore, the general support provided by the institution to both learners and educators in as far as effective utilization of ICTs was found to be very low. Drawing from this position, the university management may heavily invest in teaching and learning technology to improve service delivery in line with the institutional mandate.

The paper contributes to the extant literature on technological interventions in institutions of higher learning in Zimbabwe, regionally, and at the international level as well. Correspondingly, the research would give a voice to the underrepresented class of students in universities and create social justice in the higher education learning system. Furthermore, the paper will help transform the researchers as higher education practitioners through a more credible understanding of the phenomenon under study.

No research is faultless, therefore, this study had methodological limitations in the form of sample size and research strategy. Future researchers can make use of the mixed method and associated research designs like embedded, convergent parallel, sequential exploratory/explanatory to have a comprehensive evaluation of the problem. Equally, the use of more than two data collection tools and different organizations is hereby recommended to assist in the achievement of credible results. Coverage of a wider geographical space enables wider discernment and representation of the study phenomenon. Despite these study constraints, the study's findings have essential theoretical and functional connotations for ICT engagement in teaching and learning in Zimbabwean state universities. Essentially, this treatise provides lecturers and learners with the knowledge to work and learn in a new ICT-enabled environment more efficiently.

5.1 Declaration of conflicting interests

The writers declared no potential conflicts of interest concerning the research, authorship, or publication of this article.

5.2 Funding

The authors received no financial support for the research, authorship, or publication of this article.

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