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Factors promoting digital exclusion of some students in higher education: a systematic review of digital divide in learning experiences

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Abstract

The Fourth Industrial Revolution has brought many changes to higher education, such as the introduction of digital technologies in teaching and learning processes. In this systematic literature review, studies from repositories like EBSCO and Google Scholar were collected to understand how the Technology Acceptance Model could provide answers to the said linkages. The study then focused on technology use in education and the consequent improvement of academic performance whilst identifying portions of the populace, which had yet to be bridged in terms of digital exclusion. Confirmed were the findings of having a digital divide or digital exclusion among selected students, aligning to earlier studies in higher education. The study underscored the fact that digital exclusion and division are different from one person to another, from institutions, and from countries. These issues were classified into social exclusion, digital exclusion, and accessibility, thus creating a robust understanding of digital exclusion in higher education. Addressing these lighting issues could prove problematic as the solutions vary with the specific context of the institution. For example, the study proposes inclusivity measures even in higher education, such as creating digital competency training for all students and provision for the appropriate technologies. By doing so, higher education institutions can ensure equal opportunity for students to succeed in this modern digital age.

Keywords: access, competencies, digital divide, digital exclusion, higher education, Learning technologies

Introduction

Everything in the modern world of technology and communication takes on new forms and shapes. Nowadays' trends see the invasion of people's daily life by the Internet of Things, but web activities like social networking, web browsing, and cross-border connectivity are still being fostered (Paul, 2024). As reported by Abdullah et al. (2022), this worldwide shift has availed numerous learners to higher education and has increased the percentage of higher education completion rates. The integration of ICTs in the education system has even transformed education provision in the higher learning institutions where, for instance, there is use of virtual learning environments, AR/VR, massive open online courses (MOOCs), and video conferencing systems that allow teaching and learning to be done at any geographical and chronological setting (Sims, Vidgen, & Powell, 2008).

However, the introduction and implementation of ICTs have not been an advantage to all classes of people in equal measure (Ahmad, 2021). Not all individuals are allowed to fully get into the society and contribute due to digital technologies, an exclusion which is commonly referred to as digital exclusion. Such an approach is considered in a research and innovation program of the European Union called 'Platform for ICT for Learning and Inclusion' (European Commission, 2014). In an attempt to explore the major dimensions and intricacies of the digital divide and digital exclusion, this systems review seeks to investigate the factors contributing to these phenomena. Also, different perceptions on ICT use are also analyzed in this paper, where attention is drawn to the factors that prevent the users from embracing ICT technologies which are mostly referred to as the "barriers

to the integration and adoption of educational technologies" (Pelgrum, 2001; Hew & Brush, 2006; Bingimlas, 2009; Khalid, 2014; Al-Adullati & Gameil, 2021) and the related uncertainties of the concept of digital exclusion. According to a systematic review of the existing literature, it is safe indeed to say that the two terms, barriers, and divide are the corollary of digital exclusion. However, a significant shortage of understanding on digital exclusion in the context of higher education can easily be pointed out.

With education being inh the present era altered by inclusive technologies; consumption of digital teaching resources has profoundly affected different aspects of learning (Bhat, 2023; Tumtaveera, 2023). As such situations were ground for the widespread adaptation of these technologies as aspects of our life entirely, the digital divide is still a stark reality. This study extends the current boundaries of knowledge on digital exclusion in higher education by addressing what are the causes of disparities in accessing and utilizing learning among various student groups. Hence, it is important in focusing higher education institutions on enhancing learning through digital education strategies by critically interrogating possible bottlenecks in access and participation in high quality higher education bereft of bias but with justice in every sense of the word (Batisai et al., 2022). The concept of the digital divide can be applied to all these differences and many more through subparagraphs, which suggest that they can be differences in access to computers and the internet or difference in computer literacy. Such imparity however can present as a barrier to engagement in the learning process and achievement of one's academic goals. (Chmunorwa & Mugobo, 2023). Given this scope identified through a critical examination of the relevant literature, this study aims to recognise the elements of a few students that contribute to their digital exclusion in higher education. According to the understanding of those factors, educational institutions will be able to put in place measures that can help overcome the digital divide at the institution and provide all students a proper educational environment including equitable chances to fully participate in their learning (Hamzah et al., 2016; Helsper et al., 2022).

This publication calls out for the necessity to alleviate exclusion associated with digital devices and its relation to education in particular. By investigating further the reasons that make this phenomenon more likely to persist, we also seek to shape recommendations for policies, curricula development, and student affairs. In the end, the purpose is to encourage to implement an education that is not only barrier-free but also inclusive where digital tools are not devices of power but tools for learning (Chkwunemerem, 2023).

Literature Review

The digital divide in South African higher education is a persistent and multifaceted issue that reflects disparities in access to digital technologies, digital infrastructure, and digital literacy across socio-economic, geographical, and institutional contexts, effectively undermining aspirations for a free and inclusive higher education, especially considering that digital transformations have become central in teaching and learning and in the academic process (Fleur & Dlamini, 2022; Landa et al., 2021).

Structured access to a range of digital tools such as laptops, smartphones, tablets, and stable internet connectivity forms the basis of digital participation in higher education still remains an unsolved matter. Yet, students coming from rural and under-resourced areas are disproportionately disadvantaged in this respect; hardware access and bandwidth capabilities remain unattainable in most cases for these students (Khalid & Pedersen, 2016; Ajani & Maphalala, 2023). Whereas students located in urban or affluent environments benefit from robust infrastructure and in-house connectivity, their counterparts in outlying areas are again impeded by a mobile phone and minimal public access points, limiting their ability to fully participate in online learning platforms (Maphalala et al., 2021; Mayombe, 2023). These disparities in technological access have serious consequences for continuity of learning, especially when digital access is critical to academic survival in cases of emergencies such as the COVID-19 pandemic.

Socioeconomic status remains one of the prime determinants affecting digital education access. Low-income household students have fewer tendencies to own personal devices and also lack the financial means to stable internet access, resulting in their resorting to the expensive purchase of mobile data or reliance on unreliable public Wi-Fi (Nhlumayo, 2022; Olawunmi & Mavuso, 2022; Timotheou et al., 2023). Geographically, urban campuses have better connectivity and institutional support compared to the rural institutions, which largely suffer from structural deficits on infrastructure development, thus producing regional disparities in terms of access and quality of digital engagement (Moon, 2023; Nawagi & Raman, 2023). These imbalances function not only as academic disadvantage but as part of a broader social-economic inequity that discourages further student positioning in the digital economy (Mhlanga & Moloi, 2020; Afolabi & Ajani, 2023).

Digital literacy is a set of skills to use digital tools effectively for learning, communication, and critical inquiry (Wilkins & Huisman, 2025). Hence, digital literacy is a significant yet variably distributed skill among university students in South Africa. Indeed, many of these students, especially those drawn from historically disadvantaged

schools, enter higher education with low competencies with respect to working in digital environments (Pillay, 2021; Xulu-Gama & Hadebe, 2022). Consequently, they struggle greatly to locate, evaluate, and apply digital resources to any great effect. Furthermore, low levels of digital literacy will limit the participation of students in online learning with low levels of confidence in digital engagement, which often manifest as barriers to participation in interactive educational experiences (Ilhan et al., 2021; Llhan et al., 2021). Therefore, these gaps in digital readiness further exacerbate the gulf between digitally gifted and digitally deprived students.

While strategies to address digital access constraints in South African higher education vary among institutions, there remains a gray area with lot black and white. Whereas some universities are seen providing the poor but deserving with borrowed gadgets, data packages, and e-learning support centers, others are constitutionally incapable in terms of institutional capacities or without policy frameworks (Raducu & Stanculescu, 2021; Faloye & Ajayi, 2022). The unidirectional model for institutional readiness only deepens the existing spread of differences, allowing student experiences of digital learning to be determined by whatever resources and strategies the universities in question happen to avail them with (Ajani & Khumalo, 2023). Inclusivity extends to ensuring faculty is adequately developed to properly design digital programs that are inclusive, accessibly designed, and consider the diverse digital realities of the student cohort (Faloye et al., 2022; Odularu et al., 2023).

There are significant pedagogical implications of the digital divide. This includes the requirement for academics to allow for the affordances of digital innovation to be appropriately balanced with the situation of student differential access levels. Failure to meet this will inadvertently cause a reinforcement of traditional exclusionary behavior within the domain of technology (Gamede et al., 2022). This is significant because under-prepared students will secure diminished success against their better-equipped colleagues. In teaching and learning, attrition is inevitable, along with dejection arising from better-educated students from even more frustrating unevenness of higher education outcomes (Itasanmi et al., 2022b). Filling the gap necessitates the pivoting of curricula towards different modes of pedagogy that meet the varying levels of digital readiness; others would suggest designing low-tech alternatives and blended instructional modalities with supported living structures.

Addressing digital exclusion in South African higher education calls for an all-encompassing multidisciplinary approach. For starters, government intervention is obligatory, particularly investing in rural infrastructure and making internet access cheap or affordable to far-flung and underserved regions (Sokhulu, 2020). On the other hand, higher learning institutions have a huge role to play in the transformation toward a more digitally equitable playing field. Having included in their digital policies loaning of devices, campus-wide Wi-Fi enhancements, and general digital literacy modules, such engagements would be the most beneficial and easiest way yet (Woldegiorgis, 2022; Mayombe, 2023). Perhaps the partnerships with private entities could come in to ignite a greater zeal by supporting the provision of cost-effective data bundles, digital skills programs, and mentorship initiatives.

These strategies should also extend to the faculty development that will guarantee the teaching delivered aligns itself with the varying realities of digital unevenly inclined students (Uleanya & Ajani, 2022). Modern, early 21st-century higher education, with the acknowledgment of the digital divide and partial response by some, created an opportunity for schools to bridge the divide to catch up with their more digitalized (some said "colonizing") benefactors before total abandonment.

Theoretical Framework

The Technology Acceptance Model (TAM) is a theoretical framework that seeks to explain and predict individuals' acceptance and usage of new technologies. It was initiated by Fred Davis in the late 1980s and since then has seen tremendous acceptance and elaboration across various fields, such as education. TAM asserts that the two main factors that affect an individual's intention to use the technology are perceived usefulness (PU) and perceived ease of use (PEOU). In the context of the digital divide in higher education, TAM will help us explain how the acceptance and adoption of digital technologies by students might be contributing towards or mitigating the divide (Mashile, 2017).

Perceived Usefulness (PU): This component in the TAM-family literature refers to the subject's belief that using this technology will improve performance, productivity, or accomplish objectives. In terms of higher education and the digital divide, students perceive digital technologies to be beneficial for the benefit of their learning experiences and hence are more likely to embrace technologies (Zhang, 2013). If students from underserved backgrounds or those experiencing digital exclusion believe that digital tools can actually help improve their educational outcomes, they will probably be motivated to bridge the divide. For they seek to act on this motivation by appearing puts on a variety of activities and opportunities (by) producing IT-infused lessons and inviting-it is pertinent that lenders on their own scrounge or lever up teaching resources on their feet. This increases ease of use and usefulness perception.

Perceived Ease of Use (PEOU): This dimension refers to the individual's perception regarding how easy it is to operate a system or software easily. How the university makes sure about user-friendly software and training and support about software use that can create ease of use perception for the students is a stronger focus (Faloye et al., 2020). The lesser difficult it is for students to adapt to digital technologies, the more proficient they will be in actually lessening the digital divide for those who may or may not know about technology.

TAM may help in finding solutions to address the digital divide in education resting at different levels (Zhang, 2013). By giving training sessions, workshops, and any kind of support lessening the shyness among those who may be quite ignorant about digital technologies, the later on perceived ease of use for them can be boosted. Once students become confident and assume informal familiarity with utilizing these tools, the Digital Divide subsides (Maphalala et al.,2021). Equally, the institutions could also highlight the relevance of the technologies and how they could enhance outcomes and make education more adaptable to the ease of use aspect. Once students sense that these tools would highly support their academic journey, some should naturally tend to adopt it (Faloye et al., 2020). It is assessed that the institutions should make efforts aimed at making sure that all students, no matter the social group from which they come, have access to the essentials, such as the hardware and connected Internet, whether from private residential institutions or off-campus facilities. Such a push would aid in addressing barriers faced by students on issues of affordability and access. Thus addressing both usefulness and easiness perceptions morale. Most of our South African students, especially in rural universities and study programs, are typically disadvantaged financially, owing to housing and to a sizable extent dismally antagonized because of poor tools and internet inadequacy and regular subscription. Showing/cuing relevance and manner in which digital technology can fuel up learning outcomes and open up education and modernization will somehow hover along usefulness.

Turning to Universities, they must design digital tools compliant with the diversity that characterizes different social groups in varied learning environments (Zhang, 2013). Hence, when designing digital tools, consideration must be given to making the same accessible, inclusive of alternative capabilities for the purposes of learning styles and disabilities. By doing so, higher education institutions can bestow upon the disadvantaged students access to higher-grade education, hereby killing the divide as much as they can through the TAM implementation thereof (Brown & 2021). With the Technology Acceptance Model in the realm of the digital divide in higher education, institutions might out-create solutions to promote broader acceptance of technology to reduce the odd disparities in use and access among students (Zhang, 2013).

Method

The study employed an SLR (systematic literature review) to explore the digital exclusion of students in South African higher education institutions. The SLR approach was selected because of its rigour in systematically identifying, evaluating, and synthesising existing literature so that a comprehensive, unbiased account could be provided regarding the nature, extent, and implications of digital exclusion (Moher et al., 2009). This method made it possible for researchers to critically review the whole range of factors behind digital disparity and to evaluate proposed solutions within the national context. The objective of this review was to identify and synthesise empirical research, reports, and scholarly work that dealt with digital exclusion vis-à-vis higher education students in South Africa, including access to technology, connectivity, digital skills, and barriers to inclusion.

An initial pool of 262 publications emanated through a search on academic databases such as ERIC, Scopus, PubMed, Web of Science, and Google Scholar. For better relevance and precision, the search strategy employed Boolean operators with key terms like “digital exclusion,” “digital divide,” “higher education,” and “South Africa” as queries (Page et al., 2020). Inclusion criteria were that manuscripts must be in English. They should have been published from 2010 onward. The focus should be exclusively on the digital exclusion of South African higher education students. To be eligible for inclusion in this review, studies had to consider issues of access to digital technologies, internet connectivity, and digital literacy. Any publication falling outside of these thematic and contextual limits, particularly non-English texts or those unrelated to higher education or digital inequality in South Africa, was automatically excluded.

Thereon, a process of structured screening was initiated, with considerations to engage all relevant material. In the first phase, relevance was evaluated on the basis of titles and abstracts, upon which full-text screening was conducted for articles meant for inclusion. A total of 77 studies then qualified for thematic analysis. Reviewers worked independently throughout the review process in order to prevent domination from factors that could sow bias or affect reliability. Any outstanding disagreements noted during the article selection were discussed, and consensus was reached. Subsequent steps to article selection included practical considerations like full-text availability and institutional access through South African university library subscriptions.

The review aligned itself with the PRISMA framework to preserve that methodological integrity and transparency (Page et al., 2020). The PRISMA flow diagram systematized the process of communicating the protocol, compartmentalising four key stages: identification, screening, eligibility assessment, and data extraction (**Fig.1** below). These stages were visually represented on the PRISMA diagram, which illustrates the dynamics of study retention and exclusion. The utilization of the PRISMA tool guarantees that this review can be replicated, thus promoting the trustworthiness of the research process through the clear documentation of how literature was gathered, filtered, and analysed. Thanks to this systematic and transparent approach, the review will offer a sound evidence base for understanding and addressing digital exclusion in South African higher education.

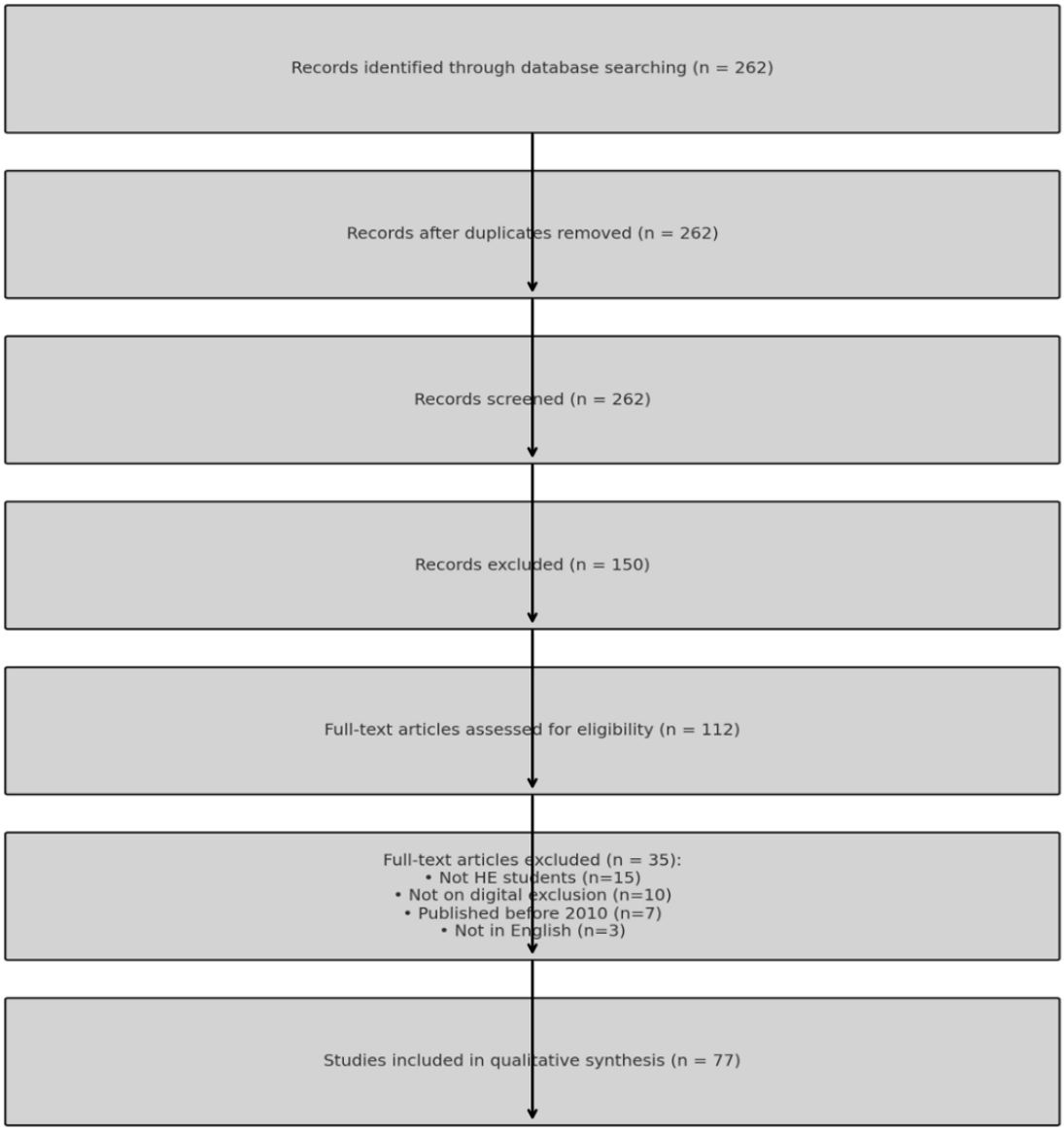

Fig. 1 : *Literature review for the study using PRISMA flow* (Page et al., 2020).

The diagram shows the authors searched six databases and found records amounting to 1,234. They screened out 1,175, as they were found to be irrelevant, duplicates, or elsewhere in the same review. From the remaining 59 studies, the 10 that were excluded from the study are not shown. The PRISMA flow diagram is a tool that is crucial for conducting and reporting systematic reviews and meta-analyses. It is, therefore, recommended to check the PRISMA checklist while constructing the flow diagram. This checklist entails a guide about how to perform each of the tasks inside the diagram. Data were systematically extracted from select articles based on a predefined data extraction form. The extracted data included author(s), length of publication, methodology, sample size, key findings, and implications regarding digital exclusion in higher education. The methodology used in articles was assessed using different quality assessment tools, such as the Joanna Briggs Institute Critical Appraisal tools, to determine the reliability and validity of the research obtained in this review.

Narrative synthesis was used to analyze and interpret the selected studies' findings (Faloye et al., 2022). The synthesis generated several identified themes connecting factors contributing to digital exclusion, impact on learning experiences, and what potential solutions might be. As this review did not deal with conducting primary research but was instead an analysis of published literature, ethical approval had to be unnecessary (Page et al., 2020). Yet, ethical aspects, such as making proper citation references to sources of literature, as provided by the copyright regulations, in use have had relevance. As per Page et al. (2020), the findings of the systematic review adhered to well-established reporting guidelines such as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Some limitations that might have been posed by the systematic review include potential publication bias, differences in study quality, and the dynamic state of digital exclusion. This systematic review aimed to provide a comprehensive synthesis of the existing body of literature on digital exclusion among higher-education students in South Africa. By exploring the contributing factors, consequences, and mitigating solutions, this review lends an elucidation to the understanding of this vital issue and lends its support to further research and policy initiatives.

Findings

Education Landscape in South Africa Preceding the COVID-19 Pandemic

The context of the education system in South Africa has gone through significant changes in the course of time (Faloye et al., 2022; Gamede et al., 2022). The aim of this literature review is to explore the status of South Africa's education system even before the breakout of the COVID-19 pandemic. This includes governance, challenges, education access, etc. Regarding the governance structure, South Africa's education system is overseen by two national bodies: the Department of Basic Education (DBE) and the Department of Higher Education and Training (DHET) (Mhlanga & Moloi, 2020). The DBE essentially is the head of primary and secondary education, while DHET administers tertiary education and vocational training (Mhlanga & Moloi, 2020), and at that time, prior to 2009, they fell under one umbrella, the Department of Education (Mhlanga & Moloi, 2020). Furthermore, because there are not enough opportunities, providing access to education is a struggle in South Africa, especially at tertiary levels (Mhlanga & Moloi, 2020). Educational disparities abounded among students from different socioeconomic strata (Landa et al., 2021). Government measures withstanding, educational accessibility became a persistent issue.

As for the educational setup in South Africa-a host of underlying challenges bedeviled the system even before the eruption of the COVID-19 pandemic (Maphalala & Ajani, 2023). Examining the challenges: Inadequate infrastructural facilities in under resourced and rural schools hindered the effective application of learning resources. Additionally, racism and gender-specific challenges faced by female students were pertinent issues for these institutions (Pillay, 2021). Furthermore, there was much anticipation as to how the institutions would cope with crisis situations as major as the COVID-19 pandemic (Landa et al., 2021). The advent of the COVID-19 pandemic necessitated the upliftment of the usual face-to-face teaching sessions into the digital world in South Africa (Faloye et al., 2022; Mhlanga & Moloi, 2020). During the pandemic, tools epitomizing the Fourth Industrial Revolution witnessed wide usage, marking a pivot in undertaking driving education toward an online learning system (Mhlanga & Moloi, 2020). Nonetheless, the historical challenge posed by the digital divide and the cost of accessing technology still significantly thwarts the smooth operationalization of online teaching and learning (Basar, 2022; Olawumi & Mavuso, 2022).

Education provided the new government with alternative strategies to support teaching and learning in South Africa (Olawumi & Moos, 2022). Civil teachings were abolished, leaving room for other developmental initiatives consequently increasing investment in blending teaching methodologies with ICT (Olawumi & Moos, 2022). This situation unveiled the urgency for policies promoting balanced integration of ICT with the education-sector landscape (Olawumi & Moos, 2022). Therefore, inequalities and disparities exposed by COVID-19 deserve to be urgently addressed in the South African educational system (Landa et al., 2021). Certainly, student contexts, encompassing socioeconomic backgrounds and resource access, significantly influenced the provision of education throughout the pandemic (Landa et al., 2021). A united front needs to be developed to resolve these disparities in ensuring equity in education.

Resource constraints, infrastructural inadequacies, and unequal access to education were some of the hurdles impeding South Africa's educational landscape well before the COVID-19 pandemic (Ayoo, 2009; Blignaut, 2009; Mashile, 2017; Nyahodza & Higgs, 2017; Basar, 2022). The pandemic accelerated the digital transformation of education, thereby triggering a heightened need for integration of innovative strategies and ICT (Mphahlele et al., 2021). Faloye (2022) goes on to confirm that the compelling need to eradicate existing discrepancies and ensure equal access to education stands out as one of the most vital slow gearing operative issues for the South African education system for the future.

Factors Responsible for Digital Exclusion of Students in South African Higher Education

Digital exclusion is defined as a condition wherein access and competence in the use of digital technologies become obstacles standing in the way of the active participation and successful completion of a student's higher education program (Azionya et al., 2021; Kumi-Yeboa et al., 2023). Mayombe (2023) has observed the presence of several contributing factors to digital exclusion for students within the South African higher education system. The following factors were reported in the literature and should be considered the major factors (Ajani, 2020; Mashau & Nyawo, 2021; Mayombe, 2023; Maphalala & Ajani, 2023). Socio-economic factors, such as poverty and limited financial means, are significant agents of digital exclusion (Mashau & Nyawo, 2021). The students hailing from disadvantaged backgrounds may not be able to access the necessary technology devices, reliable internet connectivity, and possess appropriate digital skills (Woldegiorgis, 2022). The cost of technology and the cost of obtaining internet services could turn out to be the limitations for students from the lowest income households (Mashau & Nyawo, 2021). Lack of infrastructure, including inadequate computer labs, poor Internet connectivity, and technology breakdowns, serves to exacerbate digital exclusion (Mashau & Nyawo, 2021). Some higher education institutions have been challenged in producing the information and communication technologies to support digital learning in South Africa (Woldegiorgis, 2022).

High costs associated with buying and maintaining digital equipment, internet subscriptions, and software become barriers for students (Mashau & Nyawo, 2021); this financial burden might potentially keep many students away from digital resources and from participating actively in online learning. Therefore, a lack of digital skills and readiness for higher education institutions could be one susceptibility to digital exclusion (Mashau & Nyawo, 2021). Weak training and support in IT literacy and ICT skills obstruct students from navigating digital platforms effectively and participating fully in online learning education (Mashau & Nyawo, 2021).

Research also continues to maintain that epistemological factors, such as the language of instruction and the articulation gap between school and higher education, could contribute towards digital exclusion (Xulu-Gama & Hadebe, 2022). Language barriers and inadequate preparation for the academic rigors of higher education could hamper students' access and engagement with the digital learning resources (Xulu-Gama & Hadebe, 2022). Thus, historical inequalities and structural constraints in South Africa, such as the legacy of apartheid, continue to affect access to higher education and provide for digital exclusion (Batisai et al., 2022). Resources, opportunities, and support for disadvantaged students from deprived backgrounds (Batisai et al., 2022). Yet, students with learning disabilities may face challenges to accessing and utilizing digital technologies for learning (Manase, 2021). Digital exclusion results from non-inclusive environments that can be accessed (for students with disabilities) and insufficient support systems for these students (Manase, 2021). Overcoming these issues will contribute to promoting digital inclusion and providing equitable access to higher education with South Africa. Strategies such as some monetary help for technology, building infrastructure, giving digital skills training, and nurturing enabling learning spaces put forward are appreciated interventions toward mitigating digital exclusion and conducing to the full profiling of the digital learning environment for higher education students (Lembani et al., 2020).

Impact of digital exclusion of students in higher education

The consequences of student academic performance and its connection with digital exclusion have been appraised in numerous studies (Lembani et al., 2020). The consequences have been investigated in various scholarly works. The consequences that scholars have researched due to limited ICTs, digital literacy, and barriers to ICT accessibility on the academic progress of the learners are underlined in the following studies (Faloye et al., 2022; Mayombe, 2023). There has been evidence that if students do not partake in eLearning on account of their lack of technological devices or internet service, they would be incapable of participating in online classes, gaining access to educational materials, performing their assignments, or attaining their learning goals (Kalid & Pedersen, 2016; IIhan et al., 2021; Maphalala et al., 2021; Xulu-Gama & Hadebe, 2022; Ajani & Khumalo, 2023). It could again work against student motivation with unequal engagement, correlating their potential to develop critical skills and meet their learning outcomes (Basar, 2022; Venturino & Hsu, 2022).

The research has also established the relationship between digital exclusion and educational achievement gaps (IIhan et al., 2021; Xulu-Gama & Hadebe, 2022). The academics put forth the argument that students experiencing the penalties of digital exclusion through various barriers grapple with efforts in trying to keep up with their peers with some level of access to digital resources, yielding discrepancies in academic achievements. These rifts, in all likelihood, are much more prominent than others among the marginalized poor who happen to be the most underprivileged regarding access to education (Mayombe, 2023).

The psychological impacts of digital exclusion on students make an extremely serious matter to be taken lightly (Raducu & Stanculescu, 2021) . Feelings of resentment, depression, and inferiority may emerge when students are hindered from getting involved in the digital learning world fully. Such feelings may turn out to leech away the spirit to learn, forming a backdrop to an overall splendid academic decline. As shown by some studies, a direct

linkage has been drawn between digital exclusion and the fostering of crucial digital literacy skills (Sokhulu, 2020; Venturino & Hsu, 2022). Without mastery of digital tools, the students can then encounter obstacles to obtaining vital skills like information retrieval, evaluation, and digital communication (Pillay, 2021). Indispensable for academic success these skills thus matter more profoundly and act as a model for navigating the digital sphere in the present-day world. The body of research underlines an unfortunate necessity to address digital gaps in education in order to ensure equitable learning outcomes (Azionya & Nhedzi, 2021). Olawunmi and Mavuso (2022) emphasized that recognition of the intricate interrelationships between digital exclusion and student success will allow policymakers, academics, and stakeholders to work together to formulate strategies that bridge this digital divide and level the learning playground for all students.

Discussion

The systematic literature review in this study is a kaleidoscope into one of the most complex and existing issues of the exclusion of digital tools in South African higher education. It has in view what various dimensions of digital exclusion actually entail, such as the apparent differences in economic standing of the students, digital infrastructure, the lack of institutional support towards digital access, and the different levels of digital literacy. Such a layered analysis, as discussed, brings forth a knowledge system that will provide invaluable exposure in diverse domains, mainly at the rural and marginalized student body (Ajani & Khumalo, 2023; Mayombe, 2023). These findings have only reiterated existing concerns that digital exclusion, far from its reluctant acceptance on the part of the education stakeholders at the national and institutional levels, still continues to represent a significant barrier in the higher education landscape.

One major outcome of this review is the classification of the factors of exclusion under the categories of social, technological, or access. These comprise the categories of issues such as unequal access to IT resources (for instance, the internet), computer gadgets, and online study platforms (Khalidi and Pedersen, 2016; Mhlanga & Moloi, 2020), and students being at different levels where they may use these tools effectively (Ilhan et al., 2021; Xulu-Gama & Hadebe, 2022). Also, the review articulates further that these challenges are not just merely technical but are deeply rooted in socioeconomic status, geographical area, and institutional policies. For example, students in rural institutions are mostly deserved due to poor infrastructure and a lack of an institutional response (Olawunmi & Mavuso, 2022; Sokhulu, 2020), while a few other students from urban areas also experience issues of high data costs or lack of digital fluency (Ajani & Maphalala, 2023).

Similar to that, the research also points to the importance of raising digital competencies among students as an integral part of the higher education experience. Several sources (e.g., Pillay, 2021; Faloye & Ajayi, 2022) pointed out that it is essential for institutions to include digital literacy training in their curricula, recognizing, however, that access does not simply translate into meaningful participation in such digital learning environments. Nonetheless, respondents in these reviewed works expect that an inclusive digital education approach comprises such activities as affordable loaned devices, hybrid learning models, community-based connectivity hubs to address both access and usage inequalities. Lastly, the review recognizes the influential role of staff in either nurturing or perpetuating digital exclusion, with their stances towards digital technologies (Raducu & Stanculescu, 2021; Gamede et al., 2022). Thus, this systematic review not only makes a significant contribution to the dialogue on digital equity in South African higher education but also points out the need for appropriate and pertinent steps across the policy, educator, institutional, and community level. Digital exclusion is not just a technological problem that merely engages the mind, but a systemic issue that needs to be addressed in an educational context which permeates related policies, dedicated investments, and pedagogical reforms (Uleanya & Ajani, 2022; Woldegiorgis, 2022). A reaction to the findings from this study could see the bridge of the divide between digital technology through the provision of more equitable spaces where all learners can flourish in a world in which digital reality promises, independently on any other differential factor.

Conclusions

The scope of this systematic review sheds light on the everlasting challenges associated with digital exclusion in the higher education landscape. From a range of literature, the study extracted solid facts that log the variables responsible for this problem, which span the social, digital, and environmental facets. The findings emphasize the fundamental importance of digital inclusivity in contemporary education for higher education institutions, policymakers, and educators. Tackling digital exclusion is all about a combined process of linking technology solutions and areas pertaining to social and cultural praxis. Thus, those higher education institutions should, according to form of these contextual differences, invest in digital competency building and equitable access to the necessary technological resources. Regulating the digital environment of higher education institutions would

offer genuine opportunities to all students to thrive in the digital era, and become better users of the potential that learning technologies offer.

Recommendations

The recommendations listed below seek to guide the policymakers, stakeholders, and others targeted at education on the effects of digital divide created in higher education entities in South Africa. The stakeholders should, however, invest more in the robust ICT infrastructure, internet speed, provision of digital devices in an urban and rural setting to ensure that there is equitable access in terms of resources and online learning platform (Mhlanga & Moloi, 2020).

Development and implementation of extensive training programs for learners, instructors, and administrators that would help enhance their digital literacy and skills (Nwosu et al., 2023). This includes skills improvement in such areas as understanding digital tools, search for resources online, critical thinking, and analytical skills (Nwosu et al., 2023). Such programs would develop the capability of individuals to navigate digital platforms and use digital resources for learning and research. Collaboration between higher education institutions, government agencies, and the private sector is also an enticing opportunity for pooling resources and best practices in digital inclusion promotion (Nwosu et al., 2023). Collaborative initiatives can involve, but not be limited to, formulating joint best practices, implementing several joint projects, and mobilizing funds for improving digital infrastructure and capacity-building programmes (Nwosu et al., 2023).

The integration of digital literacy and digital skills training into the curriculum throughout disciplines (Aktas & Yurt, 2017; Nel et al., 2023) shall ensure all the students receive a basic level of digital independence to enable them to survive in the digital age and workforce world (Nwosu et al., 2023). Teaching with digital tools and technologies in learning activities may also increase student engagement and facilitate active learning (Ajani & Gamede, 2021; Nwosu et al., 2023). They should focus on establishing and promoting mobile digital libraries that offer students access to scholarly resources and educational material (Nwosu et al., 2023). Mobile digital libraries could possibly surpass constraints in space and time by enabling students to access educational resources from anywhere and at any time (Nwosu et al., 2023). Such libraries should be designed to cater to diverse learning needs in a user-friendly and accommodating environment. They must be designed to cater to diverse learning needs in a user-friendly and accommodating environment.

Encourage pedagogical practices that are inclusive of various learning styles and needs (Nel et al., 2023) which include the principles of UDL providing multiple means of representation, engagement, expression (Nel et al., 2023) ensuring all students, including those bearing disabilities or coming from marginalized backgrounds, can entirely partake of digital learning environments. The establishment of support systems like digital help desks and online tutoring for assisting students as they navigate digital platforms and gain access to digital resources (Nwosu et al., 2023). They will provide technical assistance, instruction, and resources if students have difficulties using digital technologies.

Investment should be directed in research and evaluation studies to evaluate the effectiveness of digital inclusivity strategies and identify areas of improvement (Nwosu et al., 2023). This would include monitoring the impact of interventions, engagement of students and faculty for feedback, and data-decision making; this is to mention a few strategic steps in enhancing digital inclusion efforts. The proliferation of the global Covid-19 pandemic had precipitated a dramatic shift in the way learning is organized, embracing a significant chunk of various technologies and platforms into its landscape (Maphalala & Ajani, 2023). Digital inclusion for all in higher education is of utmost importance if the quality of teaching and learning is to be maintained in the various higher education institutions spread across the Republic of South Africa. In conclusion, through the adoption of these recommendations, higher education institutions in South Africa can realize digital inclusion and ensure equality for all students to succeed within the digital learning environment. (Ajani, 2022.)

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