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EXPLORING STUDENT DIGITAL RESILIENCE AND WELL-BEING AMID EDUCATIONAL DIGITAL DIVIDES IN BULAWAYO, ZIMBABWE

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ABSTRACT

This qualitative study explores how digital access inequalities shape student experiences, engagement, psychological well-being, and resilience among learners at Zimbabwe's state universities in Bulawayo. Despite global recognition of digital technologies as enablers of equitable education, persistent infrastructural, socio-economic, and institutional barriers continue to limit meaningful access for many students in developing contexts. Through semi-structured interviews and focus group discussions with 24 undergraduate students across two state universities in Bulawayo, this research examines the lived experiences of accessing digital learning resources, the consequences of digital inequality on academic participation and mental health, and the adaptive strategies students employ to sustain their learning. Findings reveal that students face significant challenges including unreliable internet connectivity, limited device ownership, high data costs, and inadequate institutional support. These barriers negatively influence academic engagement, increase psychological distress, and deepen existing educational inequalities. However, students demonstrate considerable resilience through peer collaboration, mobile-first learning strategies, offline resource sharing, and flexible study routines. The study identifies critical institutional and contextual factors such as infrastructure deficits, inconsistent policy implementation, and socio-economic disparities that perpetuate digital divides. This research contributes empirical evidence to inform policy interventions and institutional practices aimed at promoting digital equity and supporting student well-being in resource-constrained educational settings.

KEYWORDS: digital divide, digital resilience, student well-being, academic engagement, higher education, Zimbabwe, digital equity, access inequality.

1. INTRODUCTION

1.1 Background and Context

The integration of digital technologies into higher education has become increasingly central to contemporary pedagogical practice, promising expanded access to knowledge, enhanced learning experiences, and greater educational equity. However, the reality of digital education reveals persistent inequalities that mirror and often amplify existing social and economic disparities. The digital divide, characterised by unequal access to technology, connectivity, and digital skills, continues to shape educational opportunities and outcomes across global contexts.

In developed countries, significant attention has been directed towards understanding and addressing digital inequalities within education systems. The Organisation for Economic Co-operation and Development emphasises that even in advanced economies with relatively strong baseline connectivity, inequities in access and digital competencies can undermine the potential of digital tools to enhance learning outcomes and student well-being (OECD, 2023). Research by Van de Werfhorst and colleagues demonstrates how digital divides in online education persist across multiple developed countries, with disparities shaped significantly by socio-economic status, migration background, and gender (Van de Werfhorst et al., 2022). These findings highlight that unequal access and competence affect educational engagement and outcomes even in high-income contexts. Furthermore, Ireland's comprehensive literature review synthesises policy and practice in digital equity across OECD and European education systems, showing that digital divides persist due to socio-economic and demographic factors despite broad infrastructure development (Ireland, 2025). These global studies establish that technology access alone does not guarantee educational equity, and that institutional, economic, and social contexts critically mediate the relationship between digital resources and learning outcomes.

Within the Southern African Development Community region, digital education initiatives have been promoted as tools for expanding access and improving equity. The SADC Digital Education Roadmap outlines strategic initiatives aimed at equity and inclusion, highlighting necessary investments in infrastructure, teacher capacity, and digital inclusion strategies across member states (SADC Secretariat & Partners, 2024). However, empirical evidence suggests significant implementation gaps. Research by ResearchICTAfrica reveals that despite policy commitments, actual internet access and digital inclusion remain low in several

SADC states, particularly due to affordability barriers and rural-urban divides (ResearchICTAfrica, 2017). The Baseline Situational Analysis on Open Distance Learning conducted across SADC member states examines barriers and opportunities for expanding equitable access to education via digital channels, underscoring persistent infrastructural and capacity constraints that limit meaningful participation (Isaacs & Mohee, 2020). These regional studies demonstrate that whilst policy frameworks for digital education exist, structural barriers continue to constrain access and equity across the region.

In Zimbabwe specifically, the digital divide presents acute challenges for educational access and quality. Research by Moyo and colleagues investigates how digital inequalities affect access to quality education in open and distance e-learning contexts, providing structural analysis of the obstacles faced by Zimbabwean learners (Moyo et al., 2025). Their findings highlight that limited access to digital platforms significantly undermines academic engagement, with connectivity issues and infrastructure gaps creating stress and frustration that affect student motivation and learning continuity. Mweha's desk review examines technological tools, pedagogical strategies, and accessibility issues in Zimbabwe's digital learning landscape, highlighting infrastructure challenges, internet access constraints, and digital literacy gaps as persistent barriers (Mweha, 2025). Furthermore, Chidakwa explores disparities between rural and urban Zimbabwean contexts regarding access to digital technologies and connectivity, focusing on how these barriers shape educational outcomes and equity (Chidakwa, 2024). Collectively, this local research establishes that Zimbabwean students face significant structural constraints that limit their ability to participate fully in digital education.

The city of Bulawayo, Zimbabwe's second-largest urban centre, hosts several state universities serving diverse student populations. Whilst Bulawayo benefits from relatively better infrastructure compared to rural areas, students still face considerable challenges related to unreliable electricity supply, limited broadband connectivity, and high costs of data and devices. These contextual realities shape how students experience and navigate digital education, creating conditions that require both institutional support and individual adaptation. Understanding these experiences is essential for developing responsive policies and practices that can promote digital equity and support student success.

1.2 Research Problem

Whilst existing literature documents the existence and consequences of digital divides in education, significant gaps remain in understanding the specific experiences of university students in Bulawayo, Zimbabwe, particularly regarding how digital access inequalities influence their academic engagement, psychological well-being, and development of resilience strategies. Previous studies have tended to focus either on broad policy analysis or on technical infrastructure deficits without adequately capturing the lived experiences of students navigating these challenges. There is limited empirical evidence examining the intersection of digital access, academic engagement, and mental health among Zimbabwean university students. Furthermore, whilst research has identified various barriers to digital inclusion, less attention has been given to understanding the adaptive strategies students themselves employ to sustain their learning despite these constraints. Practically, institutions lack contextually grounded evidence to inform targeted interventions that could promote digital equity and support student well-being. This study addresses these knowledge and practical gaps by providing in-depth qualitative insights into student experiences within the specific context of Bulawayo's state universities.

1.3 Aim of the Paper

This paper aims to explore how digital access inequalities shape student experiences, academic engagement, psychological well-being, and resilience within state universities in Bulawayo, Zimbabwe.

1.4 Objectives of the Paper

1. To explore students' experiences of accessing digital learning resources within educational institutions in Bulawayo.
2. To examine how digital access inequalities influence students' academic engagement and psychological well-being.
3. To understand the strategies students use to develop digital resilience in the face of limited or unequal access.
4. To identify institutional and contextual factors shaping equality and access in digital education in Bulawayo.

1.5 Research Questions

1. What are students' experiences of accessing digital learning resources within educational institutions in Bulawayo?

2. How do digital access inequalities influence students' academic engagement and psychological well-being?
3. What strategies do students use to develop digital resilience in the face of limited or unequal access?
4. What institutional and contextual factors shape equality and access in digital education in Bulawayo?

1.6 Significance of the Study

This study holds empirical significance by contributing original qualitative evidence on the lived experiences of university students navigating digital inequalities in a Zimbabwean urban context, thereby enriching the limited body of research on digital resilience and well-being in Sub-Saharan African higher education. Practically, the findings provide actionable insights for university administrators, educators, and student support services to develop targeted interventions that address specific access barriers and support student coping strategies. From a policy perspective, this research offers evidence-based recommendations for national and institutional policy frameworks aimed at promoting digital equity, informing investment priorities in infrastructure and support services, and guiding the development of inclusive digital education strategies that recognise and respond to the realities faced by students in resource-constrained settings.

1.7 Theoretical Framework

This study is grounded in the Digital Divide Framework and the concept of Digital Resilience. The Digital Divide Framework, as conceptualised by scholars such as Van Dijk, distinguishes between different levels of digital inequality including access to devices and connectivity, digital skills and competencies, and meaningful usage patterns that translate into tangible benefits. This framework helps to analyse not only whether students have access to technology but also how institutional, economic, and social factors shape the quality and outcomes of that access. Complementing this, the concept of Digital Resilience focuses on individuals' capacity to navigate, adapt, and recover from challenges in digital environments. Digital resilience involves cognitive, emotional, and behavioural strategies that enable students to sustain engagement and well-being despite encountering digital barriers. By integrating these frameworks, this study examines both the structural inequalities that constrain access and the agency students exercise in developing adaptive strategies to overcome these constraints.

2. LITERATURE REVIEW

2.1 Students' Experiences of Accessing Digital Learning Resources within Educational Institutions

Understanding how students experience access to digital learning resources is fundamental to addressing educational equity in increasingly technology-mediated learning environments. Research across global, regional, and local contexts reveals diverse experiences shaped by infrastructure, institutional support, and socio-economic circumstances.

In developed contexts, studies demonstrate that even where baseline technology access is relatively strong, students' experiences of digital learning remain uneven. Costa's qualitative research with higher education students in the United Kingdom and Brazil found that whilst students were proficient in using digital tools, they often felt constrained by institutional expectations and surveillance mechanisms, indicating that access alone does not guarantee meaningful participation or empowerment (Costa, 2018). Similarly, Livingston and colleagues conducted cross-country empirical research using surveys and interviews to capture students' perceptions of digital inclusion post-COVID-19, finding that whilst developed contexts reported better infrastructure, persistent gaps remained in digital literacy support and alignment between technological provision and actual learning needs (Livingston et al., 2023). Keane and colleagues surveyed university students across Europe regarding their expectations and actual use of digital learning technologies, discovering that students anticipated high-tech support but experienced considerable variability in access and institutional readiness, highlighting the importance of robust institutional infrastructure even where baseline access exists (Keane et al., 2023). These global studies establish that students in developed countries expect substantial digital support and that gaps between expectations and institutional capacity can undermine learning experiences.

Within the SADC region, research reveals more acute challenges related to infrastructure and resource constraints. Tefo's qualitative interviews with Open Distance Learning students in South Africa explored perceptions of digital access centres on university campuses, finding that awareness and actual usage were limited despite the existence of facilities, with reliability issues such as poor connectivity significantly undermining access to digital learning resources (Tefo, 2023). Kajee and Balfour's qualitative exploration of under-resourced students' digital literacy practices at a South African university found that uneven access shaped learning practices substantially, with students from less privileged

backgrounds feeling marginalised by digital exclusion and compensating through informal strategies that nonetheless left them with persistent limitations (Kajee & Balfour, 2011). Furthermore, Shikali and Muneja conducted a systematic review of African university students' access to digital library resources during COVID-19, finding that whilst virtual services expanded, internet connectivity and device availability remained major barriers across the continent (Shikali & Muneja, 2024). These regional studies highlight that physical provision of access points does not automatically translate into effective use, and that marginalisation based on socio-economic status remains a significant factor shaping student experiences.

Research from Zimbabwe demonstrates particularly challenging conditions for accessing digital learning resources. Maune employed a Delphi technique with expert and student panels to examine adoption of e-learning platforms by Zimbabwean universities, revealing that institutional adoption was uneven and students faced considerable challenges accessing platforms due to connectivity issues and skills gaps (Maune, 2023). Makaye's qualitative study at a Zimbabwean university examining mobile learning experiences found that time constraints combined with lack of reliable Wi-Fi and electrical power made mobile devices the most accessible option for learning, though this access remained limited in depth and quality (Makaye, 2020). Nherera's document analysis and stakeholder interviews on digitalisation of higher education in Zimbabwe found that whilst digital learning opened some opportunities, poor connectivity, intermittent electricity, and limited student-teacher engagement constrained meaningful access (Nherera, 2024). Collectively, these studies establish that Zimbabwean students' experiences of accessing digital learning are characterised by significant infrastructural and institutional barriers that limit both the availability and quality of digital education.

Across all three contexts, a common pattern emerges wherein access to digital learning resources is mediated not simply by technology availability but by broader institutional, infrastructural, and socio-economic factors. Students in developed contexts report mismatches between expectations and support, regional contexts reveal persistent marginalisation despite policy commitments, and local Zimbabwean contexts demonstrate acute infrastructural constraints that fundamentally limit access possibilities.

2.2 How Digital Access Inequalities Influence Students' Academic Engagement and Psychological Well-Being

Digital access inequalities have profound implications not only for academic participation but also for students' mental health and overall well-being. Research demonstrates strong connections between digital access barriers and both diminished academic engagement and increased psychological distress.

Global studies provide robust evidence of these relationships. Neagu and Vieriu conducted a quantitative survey of 208 undergraduate students in Romania using validated psychometric instruments, finding strong, statistically significant positive correlations between digital well-being and psychological well-being, whilst heavy digital engagement that was poorly supported increased stress and digital fatigue, negatively affecting student well-being (Neagu & Vieriu, 2025). This underscores how digital engagement patterns are intimately linked to student mental health and academic balance. Michikyan's quantitative analysis of 1,224 undergraduate students in the United States using multivariate analysis of variance and regression techniques found that digital connectivity and engagement variables such as digital skills and persistence were positively associated with intrinsic motivation and academic persistence, indicating that digital inequality influences motivation and engagement patterns substantially (Michikyan, 2025). A systematic literature review examining impacts of digital inequality on educational outcomes globally found that students from low-income and minority backgrounds with limited access to digital technologies showed lower academic achievement and reduced development of digital literacy, contributing to academic disengagement (Miah, 2024). These global findings establish that unequal access increases stress and fatigue whilst undermining motivation and achievement.

Within the SADC region, similar patterns emerge with additional contextual challenges. Mateko and colleagues conducted qualitative content analysis comparing digital inequality and transformation at historically disadvantaged versus historically advantaged South African universities during COVID-19, finding that students at disadvantaged institutions faced poorer infrastructure, weaker digital support, and limited access, which negatively shaped academic engagement and participation compared to peers at advantaged institutions (Mateko et al., 2025). Chauke's secondary data analysis of SADC student academic development during the COVID-19 pandemic found that disruptions to traditional learning highlighted digital access gaps, with students developing self-directed and adaptive learning behaviours

that indicated the interactive relationship between access inequalities and academic engagement (Chauke, 2024). The SADC Digital Education Roadmap, whilst primarily a policy document, emphasises that digital technologies can support psychosocial well-being and engagement but require equitable access and supportive policies to mitigate digital access inequalities (SADC Secretariat, 2024). These regional studies demonstrate that institutional inequality in digital provision directly shapes student engagement capacity and well-being outcomes.

Research from Zimbabwe provides contextual evidence of how access barriers influence engagement and well-being specifically. Moyo and colleagues conducted qualitative interviews and focus groups at Zimbabwe Open University exploring digital divide impacts on access to quality education, finding that students reported limited access to digital platforms undermined their academic engagement in open and distance e-learning, with connectivity issues and infrastructure gaps creating stress and frustration that affected motivation and learning continuity (Moyo et al., 2025). Nherera's document analysis of digital learning adoption in Zimbabwean higher education found that whilst digital platforms increased some efficiencies, poor connectivity and lack of engagement support reduced meaningful academic engagement, whilst these barriers also posed psychological strain due to frustration and academic uncertainty (Nherera, 2024). Chidakwa's qualitative analysis of Fourth Industrial Revolution tools' potential for bridging digital divides in rural Zimbabwe found that persistent lack of connectivity and devices negatively affected academic opportunities and engagement for rural learners, indicating that inequality in access constrains educational participation and related psychological confidence (Chidakwa, 2024). These Zimbabwe-specific studies establish that access constraints directly harm both academic involvement and student psychological well-being.

Across contexts, the evidence demonstrates that digital access inequalities function as barriers not only to participation but also to motivation, psychological health, and sustained engagement. The relationship between access and well-being appears to be bidirectional, with poor access diminishing well-being and psychological distress further undermining capacity to engage with available resources.

2.3 Strategies Students Use to Develop Digital Resilience in the Face of Limited or Unequal Access

Despite facing significant digital access barriers, students demonstrate considerable agency and resilience through various adaptive strategies. Understanding these strategies is essential for supporting student success and informing institutional interventions.

Global research identifies several core resilience strategies employed by students. Pan and colleagues conducted a systematic literature review published in a leading journal, finding that students develop digital resilience through coping strategies, adaptive learning behaviours, and reflective recovery practices when encountering digital barriers, with resilience strengthened through learning from past digital challenges rather than relying solely on access availability (Pan et al., 2024). Hassoun and colleagues' qualitative ethnographic study involving interviews and participatory observation among university students found that students rely on information sensibility, peer knowledge sharing, and emotional self-regulation to navigate digital constraints, with digital resilience embedded in social and cognitive practices rather than formal training alone (Hassoun et al., 2025). Naeem and Mushibwe's scoping review of peer-reviewed studies identified self-regulation, digital problem-solving, help-seeking, and adaptive time management as dominant resilience strategies among students facing access constraints (Naeem & Mushibwe, 2025). These global studies establish that resilience involves cognitive, emotional, and social dimensions working in concert.

Regional research from the SADC context reveals adaptation strategies shaped by particular resource constraints. Kajee and Balfour's qualitative interviews and discourse analysis with undergraduate students in South Africa found that students developed resilience through informal peer networks, mobile learning improvisation, and self-taught digital literacy practices in response to institutional resource inequalities (Kajee & Balfour, 2011). Tefo's qualitative interviews with Open Distance Learning students found that students developed resilience by restructuring study routines, sharing digital resources amongst peers, and maximising limited access windows to institutional digital facilities (Tefo, 2023). Mateko and colleagues' comparative qualitative case study of historically advantaged and disadvantaged South African universities found that students in disadvantaged institutions relied on adaptive learning strategies, peer mentoring, and blended learning improvisation to sustain engagement under conditions of digital inequality (Mateko et al., 2025). These regional

findings highlight the centrality of peer collaboration and schedule flexibility as resilience mechanisms.

Zimbabwe-specific research reveals particular adaptation patterns shaped by local infrastructural constraints. Makaye's qualitative case study using interviews and focus groups with Zimbabwean university students found that students developed resilience through mobile-first learning approaches, offline resource sharing, and flexible study scheduling in response to unreliable institutional digital infrastructure (Makaye, 2020). Tsokota's action research involving intervention design and reflective analysis found that digital resilience was strengthened through e-safety awareness, risk management skills, and increased confidence in navigating online academic environments (Tsokota, 2022). Moyo and colleagues' qualitative interviews and thematic analysis in open and distance e-learning contexts found that students relied heavily on peer support, digital improvisation, and self-directed learning strategies to sustain participation under persistent access constraints (Moyo et al., 2025). These local studies demonstrate that Zimbabwean students employ creative and resourceful strategies to overcome systemic barriers.

Across all contexts, common patterns of resilience emerge including peer collaboration, flexible time management, mobile-first approaches, self-directed learning, and emotional regulation. These strategies demonstrate student agency and resourcefulness whilst simultaneously highlighting that resilience should not be seen as a substitute for addressing systemic access inequalities.

2.4 Institutional and Contextual Factors Shaping Equality and Access in Digital Education

Digital access and equity in education are fundamentally shaped by institutional policies, infrastructural investments, and broader contextual factors including geography and socio-economic conditions. Understanding these structural determinants is essential for developing effective interventions.

Global research establishes the centrality of institutional and systemic factors in shaping access. Miah's systematic literature review examining how digital inequality influences educational outcomes found that digital inequality is rooted in socio-economic and institutional stratification, with students having limited access to quality technology and support services experiencing poorer outcomes, and institutional infrastructure quality and

policy supports fundamentally shaping access and equity in meaningful educational participation (Miah, 2024). Martini's empirical analysis using secondary data synthesis on the relationship between education, digital capital, and access in developed contexts such as the Netherlands and England found that education levels correlate strongly with digital capital formation, with individuals possessing more digital capital shaped by institutional and socio-economic positioning having better access and engagement, thereby demonstrating how institutional status and resource allocation influence access disparities (Martini, 2025). Barragán and Rincón's mixed-methods simulation study linking digital inequality with student dropout in higher education found that institutional infrastructure, policy supports, and socio-economic barriers are direct drivers of digital access inequity, which then increases dropout risk, with structural institutional factors such as connectivity policy, funding, and pedagogical supports shown to shape equity outcomes (Barragán & Rincón, 2025). These global studies establish that institutional commitment, infrastructure investment, and policy coherence are fundamental determinants of access equity.

Regional research from the SADC context reveals particular challenges related to institutional capacity and policy implementation. Dyantyi and Mkabile-Masebe's qualitative semi-structured interviews with students and lecturers at a South African university found that institutional investment in technology infrastructure, training, and systemic planning directly affects equity in access, with institutional commitment and policy implementation reported as inconsistent, thereby affecting equal access across socio-economically diverse student groups (Dyantyi & Mkabile-Masebe, 2025). Ajani's scoping review focused on digital education equity in rural African universities, predominantly drawing on SADC literature, found that institutional infrastructure, lack of digital literacy support, and insufficient policy frameworks severely constrain digital access and equity especially in rural campuses, underscoring institutional readiness and policy clarity as central contextual factors shaping access (Ajani, 2025). Another systematic review by Ajani focusing on digital exclusion in South African higher education contexts found that institutional digital infrastructure, information and communication technology policies, and resource allocation disparities contribute to unequal access, exacerbated by institutional policy gaps and socio-economic context (Ajani & Colleagues, 2025). These regional findings demonstrate that institutional preparedness and policy consistency critically mediate access outcomes.

Zimbabwe-specific research reveals acute challenges related to infrastructure deficits and weak policy implementation. Moyo and colleagues' qualitative thematic analysis based on interviews and focus groups with students and lecturers in open and distance e-learning contexts found that institutional policies in Zimbabwean higher education such as open and distance e-learning deployment and information and communication technology strategies are weakly implemented, limiting equitable access, with infrastructure deficits and institutional resource constraints identified as major contextual barriers (Moyo et al., 2025). Hlungwani's qualitative interview and document analysis in rural Zimbabwean secondary schools found that institutional infrastructure, connectivity, and policy support are critically lacking, generating inequitable access between rural and urban schools, with the contextual environment including location and institutional support strongly shaping digital inclusion (Hlungwani, 2025). Chidakwa's qualitative and mixed contextual analysis of Fourth Industrial Revolution applications in rural Zimbabwean education found that institutional limitations including poor policy frameworks, lack of infrastructure, and limited local support shape unequal access, with contextual factors such as rural location and socio-economic disparities compounding institutional challenges (Chidakwa, 2024). These local studies establish that Zimbabwean educational institutions face systemic challenges in infrastructure provision and policy implementation that fundamentally constrain digital equity.

Across contexts, institutional infrastructure, policy coherence, resource allocation, and contextual factors including geographic location and socio-economic conditions emerge as critical determinants of digital access and equity. These structural factors operate at multiple levels from national policy frameworks to institutional implementation capacity to local infrastructural realities, collectively shaping the opportunities and constraints students face in accessing digital education.

2.5 Gaps in Literature and Need for This Research

Whilst the reviewed literature provides valuable insights into digital divides, student experiences, and resilience strategies across various contexts, several important gaps remain. First, most existing research focuses either on broad policy analysis or on specific technical barriers without adequately integrating the lived experiences of students with analysis of structural constraints. Second, limited research has specifically examined the intersection of digital access, academic engagement, and psychological well-being within a single study, particularly in Zimbabwean contexts. Third, whilst resilience strategies have been

documented in various settings, less attention has been given to understanding how these strategies are developed and sustained specifically within the institutional and infrastructural constraints characteristic of Zimbabwean higher education. Fourth, most Zimbabwe-focused research has concentrated on rural contexts or open and distance learning specifically, with less attention to urban state university environments such as those in Bulawayo. Finally, there is limited qualitative evidence that centres student voices and experiences as primary sources of knowledge about digital inequality and resilience. This study addresses these gaps by providing in-depth qualitative exploration of student experiences at state universities in Bulawayo, examining access, engagement, well-being, and resilience holistically whilst foregrounding student perspectives and situating these within analysis of institutional and contextual factors.

3. Methodology

3.1 Research Design

This study employed a qualitative research design to explore the lived experiences, perceptions, and adaptive strategies of university students navigating digital access inequalities in Bulawayo, Zimbabwe. Qualitative research is particularly appropriate for investigating complex human experiences, meanings, and social phenomena within their natural contexts. As Lim explains, qualitative inquiry enables deep investigation into lived experiences and contextual interpretations, especially where social, cultural, and institutional factors critically shape outcomes (Lim, 2025). This design allowed for rich, detailed exploration of how students experience, interpret, and respond to digital access challenges, thereby providing insights that quantitative approaches alone could not capture. The qualitative approach facilitated understanding of the nuances, complexities, and contextual specificities that characterise student experiences within Bulawayo's state universities.

3.2 Study Population and Context

The study was conducted at two state universities in Bulawayo: the National University of Science and Technology and Bulawayo State University. These institutions serve diverse student populations including those from various socio-economic backgrounds, geographic origins including rural and urban areas, and academic programmes. Participants were purposively sampled to ensure representation across different year levels, programmes of study, and socio-economic backgrounds. A total of 24 undergraduate students participated in the study, comprising 14 female and 10 male students ranging from first to final year of

study. Purposive sampling was employed because the study required participants with relevant experiences of navigating digital learning within these institutional contexts. As Muzari and colleagues explain, qualitative research examines participants' experiences in their natural contexts to create deeper understanding of social phenomena rather than pursuing broad generalisations (Muzari et al., 2022). The Bulawayo context was selected because it represents an urban setting with relatively better infrastructure compared to rural areas, yet still faces significant digital access challenges characteristic of resource-constrained educational environments in Zimbabwe.

3.3 Data Collection Methods

Data were collected through two primary methods: semi-structured individual interviews and focus group discussions. Semi-structured interviews were conducted with 16 students, each lasting approximately 45 to 60 minutes. The interviews explored students' experiences accessing digital learning resources, the influence of access challenges on their academic engagement and well-being, strategies they employed to sustain their learning, and their perspectives on institutional and contextual factors affecting access. An interview guide was developed based on the research objectives and refined through pilot testing. Two focus group discussions were conducted, each comprising eight students and lasting approximately 90 minutes. Focus groups enabled exploration of shared experiences, collective sense-making, and peer interaction around digital access challenges and resilience strategies. As Chand explains, interviews provide in-depth insights into personal experiences whilst focus groups reveal shared social meanings, with both methods complementing each other to provide comprehensive understanding (Chand, 2025). All interviews and focus groups were audio-recorded with participant consent and conducted in English, which is the medium of instruction at the universities. Field notes were taken during data collection to capture contextual details and non-verbal communication.

3.4 Data Analysis

Data analysis followed the six-phase thematic analysis approach developed by Braun and Clarke, which is widely recognised as a systematic and rigorous qualitative analysis technique. As Ahmed explains, thematic analysis is a systematic qualitative technique that goes beyond coding to interpret patterns and meanings across data, making it particularly suitable for studies examining experience and perception (Ahmed, 2025). The analysis process involved familiarisation with the data through repeated reading of transcripts,

generating initial codes systematically across the dataset, searching for themes by collating codes into potential patterns, reviewing themes to ensure they worked in relation to coded extracts and the entire dataset, defining and naming themes to refine the specifics of each theme, and producing the final analysis by selecting vivid and compelling extract examples. This process was iterative, with constant movement between phases to ensure analytical rigour and coherence. NVivo qualitative data analysis software was used to organise and manage the coding process. The analysis focused on identifying patterns and themes related to the research questions whilst remaining open to emergent themes that arose from the data.

3.5 Ethical Considerations

This research adhered to rigorous ethical principles to protect participants' rights, well-being, and dignity throughout the research process. Ethical approval was obtained from the institutional review boards of both participating universities prior to data collection. As Mirza and colleagues emphasise, research ethics in qualitative work prioritise respect for participants, informed consent, confidentiality, and the researcher's responsibility to protect participants' well-being (Mirza et al., 2023). All participants received comprehensive written and verbal information about the study's purpose, procedures, potential risks and benefits, and their rights as participants. Written informed consent was obtained from all participants before data collection commenced. Participants were assured of their right to withdraw from the study at any time without penalty. To ensure confidentiality and anonymity, all identifying information was removed from transcripts and participants were assigned alphanumeric codes such as P01, P02 for individual interview participants and FG1-P1, FG1-P2 for focus group participants. Audio recordings and transcripts were stored securely on password-protected devices accessible only to the research team. Participants were informed that whilst every effort would be made to maintain confidentiality, complete anonymity could not be guaranteed in focus group settings due to the presence of other participants. The research posed minimal risk to participants, though discussing challenges and frustrations related to digital access had potential to cause mild discomfort. Participants were reminded of their right to decline answering any questions and information about university counselling services was provided to all participants.

4. RESULTS AND FINDINGS

4.1 Students' Experiences of Accessing Digital Learning Resources within Educational Institutions in Bulawayo

Students reported diverse and often frustrating experiences accessing digital learning resources within their institutions. A dominant theme emerging from the data was unreliable internet connectivity both on campus and at home. Participant P03 explained:

The Wi-Fi on campus is extremely unreliable. Sometimes you can connect but the speed is so slow you cannot download a single PDF file. You end up wasting your whole lunch break trying to access one document for your assignment.

Participants consistently described connectivity as inconsistent, with some areas of campus having stronger signals than others, creating competition amongst students for access to better-connected spaces. Participant FG1-P4 noted:

We all know which buildings have better Wi-Fi, so those computer labs and library spaces are always overcrowded. If you do not arrive very early, you will not find space to sit and work.

Beyond connectivity issues, access to devices presented significant challenges. Whilst most students owned mobile phones, many relied on shared or borrowed laptops and tablets for academic work. Participant P07 described:

I do not have my own laptop. I borrow from my roommate when she is not using it, which means I can only work on assignments at odd hours, sometimes very late at night when she has finished her own work.

The cost of data emerged as a critical barrier affecting access patterns. Students described making difficult choices about when and how to use limited data bundles. Participant P12 shared:

Data is very expensive. I have to budget carefully and decide which materials are most important to download. Sometimes I skip watching recorded lectures because they use too much data, and I just rely on my notes instead.

Several participants reported that institutional provision of digital resources was inadequate. Learning management systems were sometimes poorly maintained, with broken links, outdated materials, or limited functionality. Participant FG2-P3 observed:

Our lecturers upload materials on the system but sometimes the platform is down for days. Other times the files are corrupted or the links do not work. It becomes frustrating when you are trying to prepare for tests.

Access to library databases and online journals was highly valued but often difficult to utilise effectively due to both connectivity constraints and limited digital literacy regarding how to navigate these resources. Participant P15 explained:
The library subscribes to some online journals which is good, but the internet is too slow to search properly. Also, nobody really taught us how to use those databases effectively. You learn by trial and error.

Power supply emerged as an underlying infrastructure challenge affecting all aspects of digital access. Frequent electricity load-shedding disrupted both campus connectivity and students' ability to charge devices. Participant P09 described:
Load-shedding is a major problem. You might have data and a charged device, but if there is no power on campus, the Wi-Fi routers do not work. At home, I cannot charge my phone for long periods, so I have to plan very carefully.

Despite these challenges, students recognised institutional efforts to improve access where resources permitted. Several mentioned that computer labs had extended hours during examination periods and that some lecturers provided printed materials as backups. However, the overall picture remained one of significant and persistent barriers to accessing digital learning resources effectively.

4.2 How Digital Access Inequalities Influence Students' Academic Engagement and Psychological Well-Being

Digital access inequalities exerted profound influences on both students' academic engagement and their psychological well-being, creating interconnected cycles of disadvantage and distress. Regarding academic engagement, students reported that access barriers directly limited their ability to participate fully in learning activities. Participant P04 explained:
When lecturers post materials at the last minute and expect us to read before class, but you have no data or the Wi-Fi is not working, you come to class unprepared. You cannot participate in discussions properly, and you feel left behind.

This sense of being left behind was echoed by many participants, who described how access barriers created cumulative disadvantages. Missing one set of materials or one online discussion could create gaps in understanding that made subsequent learning more difficult. Participant FG1-P2 noted:

Once you fall behind because you could not access something, it becomes harder to catch up. Other students are moving forward with the content, but you are still trying to find the previous week's readings.

Assignment completion was significantly affected by access challenges. Students described spending excessive time seeking access to resources, time that could have been devoted to actual studying or assignment writing. Participant P11 shared:

I sometimes spend three or four hours just trying to download the sources I need for an assignment. By the time I actually have the materials, I am too exhausted to start writing. My productivity is very low.

Group work presented particular challenges for students with limited access, as they struggled to participate equally in collaborative projects that increasingly relied on digital communication and shared online documents. Participant P08 described:

For group assignments, other students expect you to contribute to shared Google documents or join WhatsApp video calls for planning. If you do not have data or your device battery is low, you cannot participate, and then your group members become frustrated with you.

These academic engagement difficulties translated directly into psychological distress. Students consistently reported experiencing stress, anxiety, and frustration related to digital access barriers. Participant FG2-P5 articulated:

The stress is constant. You are always worrying about whether you will be able to access materials on time, whether your data will last, whether the power will go off just when you need to submit something. It affects your mental state seriously.

Feelings of inadequacy and self-doubt emerged as students compared themselves to peers who had better access. Participant P14 explained:

You see other students with their own laptops, unlimited data, reliable power at home. They can work anytime they want. You start feeling like you are not good enough, like maybe you do not belong here because you cannot keep up.

Several participants described symptoms consistent with burnout, including exhaustion, cynicism, and reduced sense of accomplishment, which they attributed directly to the constant struggle for digital access. Participant P06 shared:
Sometimes I feel completely burnt out. You work so hard just to access basic things that should be simple. You feel tired all the time, and you start questioning whether all this effort is worth it.

Social isolation was another psychological consequence, as students with limited access felt excluded from online peer communities and study groups. Participant FG1-P6 described:
Many students communicate and share resources through WhatsApp groups and Telegram channels. If you cannot afford to be active in those spaces because of data costs, you miss out on important information and you feel socially isolated from your classmates.

The intersection of academic and psychological impacts created vicious cycles wherein access barriers undermined engagement, poor engagement increased anxiety and stress, and heightened psychological distress further reduced capacity to persist in seeking solutions to access challenges. Participant P17 observed:
It becomes a cycle that is hard to break. You feel stressed because you cannot access things, the stress makes it harder to focus and study effectively when you do get access, and then you fall further behind which creates more stress.

Financial strain added another layer of psychological burden, as students and their families struggled to afford data, devices, and other digital necessities. Participant P10 shared:
I feel guilty asking my parents for more money for data when I know they are already struggling to pay my fees. That guilt adds to the stress of not having enough access.

Despite these significant impacts, students also demonstrated remarkable resilience and determination to continue their studies, which forms the focus of the next section.

4.3 Strategies Students Use to Develop Digital Resilience in the Face of Limited or Unequal Access

Students employed diverse and creative strategies to sustain their learning despite facing significant digital access constraints. These resilience strategies operated at individual, social, and practical levels, demonstrating considerable agency and resourcefulness. Peer collaboration and resource sharing emerged as primary resilience mechanisms. Students

formed informal networks to share devices, data bundles, downloaded materials, and information about access opportunities. Participant P05 explained:
We have created our own support system. If someone manages to download lecture notes or journal articles, they share them with the rest of us via Bluetooth or memory stick. We look out for each other.

Study groups served dual purposes of academic collaboration and resource pooling. Participant FG2-P1 described:
Our study group meets at a member's house where they have more reliable power and Wi-Fi. We all bring whatever resources we have managed to access, and we work together to prepare for tests and complete assignments.

Mobile-first learning strategies were widely adopted, with students maximising use of smartphones for accessing materials, communicating with lecturers and peers, and even completing some assignments. Participant P13 noted:
My phone is my lifeline. I do almost everything on my phone now. I have learned to read PDFs on the small screen, to type essays using my phone, even to edit documents. You adapt to what you have.

Strategic time management around power availability and campus access became essential. Students developed schedules that aligned with load-shedding timetables and peak campus Wi-Fi performance times. Participant P16 shared:
I know exactly when the power is likely to be on and when campus Wi-Fi is least congested. I plan my week around those windows of opportunity. I might wake up at four in the morning when power is back to charge devices and download materials.

Offline learning strategies were employed to reduce dependence on constant connectivity. Students downloaded materials when access was available for later offline use, took detailed handwritten notes during lectures to reduce reliance on recorded sessions, and borrowed physical books from libraries. Participant FG1-P5 explained:
I have learned to work offline as much as possible. When I do get good internet access, I download everything I might need for the next week or two. I also take very thorough notes in class so I do not need to rely on recorded lectures.

Self-directed learning and problem-solving skills were developed through necessity. Students taught themselves to troubleshoot technical issues, to navigate new digital platforms independently, and to find alternative ways to access information. Participant P19 described:
You become very resourceful. If one method does not work, you find another. If the institutional system is down, you search for materials elsewhere. You learn to solve problems on your own because you cannot always wait for help.

Some students engaged in income-generating activities specifically to fund their digital access needs. Participant P07 shared:
I do some freelance work online when I can, just small jobs like data entry or social media management. The money I earn goes directly to buying data bundles and eventually I hope to save enough for my own laptop.

Emotional regulation and mindset management emerged as important psychological resilience strategies. Students consciously worked to maintain positive attitudes, to avoid comparing themselves negatively to better-resourced peers, and to focus on what they could control. Participant FG2-P4 reflected:
I try not to dwell on what I do not have. I focus on making the best use of what I can access. When I start feeling overwhelmed, I remind myself that many students before me faced similar challenges and succeeded.

Help-seeking behaviour from various sources including lecturers, library staff, and student services demonstrated adaptive resilience. Participant P21 explained:
I am not shy to ask for help anymore. I speak to my lecturers about access challenges and ask for extensions when needed. I visit the library regularly to ask staff to help me access databases. Most people are willing to help if you ask.

Flexible and adaptive approaches to completing academic work allowed students to adjust methods based on available resources. Participant P18 described:
I have learned to be flexible. If I cannot access certain sources, I use alternative ones. If I cannot watch video lectures, I read transcripts or summaries. You find ways to achieve the learning objectives even if the path is different.

These diverse strategies collectively enabled students to persist in their studies despite substantial barriers. However, as participants acknowledged, whilst these resilience strategies

were necessary and valuable, they represented individual adaptations to systemic problems that ultimately required institutional and structural solutions.

4.4 Institutional and Contextual Factors Shaping Equality and Access in Digital Education in Bulawayo

Multiple institutional and contextual factors were identified as shaping equality and access in digital education, operating at different levels from broad infrastructure to specific institutional policies and practices. Infrastructure deficits emerged as fundamental constraints operating at both national and institutional levels. The unreliability of electrical power supply affected all aspects of digital access. Participant P02 observed:

Load-shedding is the foundation of all our access problems. Without reliable electricity, nothing else works properly. Campus Wi-Fi fails, computer labs close, we cannot charge our devices. Everything depends on power.

Internet connectivity infrastructure was inadequate both in bandwidth and reliability. Participant FG1-P3 explained:

The institution's internet connection is simply not sufficient for the number of students who need to use it. Even when the system is working, the bandwidth cannot handle everyone trying to access it simultaneously.

Physical infrastructure including computer labs, charging stations, and study spaces with connectivity was insufficient to meet student demand. Participant P20 noted:

There are only two computer labs for the entire faculty. During peak times like assignment deadlines, you cannot find a free computer. The university needs to invest much more in these facilities.

Institutional policy gaps and inconsistencies created additional barriers. Several students mentioned that whilst the university had adopted online learning platforms, clear policies regarding expectations for student access, provisions for students facing access barriers, and lecturer responsibilities for accessible content delivery were lacking. Participant FG2-P6 described:

There is no clear policy about what happens when students cannot access online materials due to technical problems. Some lecturers are understanding and provide alternatives, but others just expect you to figure it out yourself.

Resource allocation decisions at institutional level were perceived as sometimes prioritising other areas over digital infrastructure improvement. Participant P22 reflected:
The institution talks about digital transformation and the Fourth Industrial Revolution, but the actual investment in infrastructure does not match the rhetoric. We need to see real commitment through budget allocation.

Lecturer digital competency and engagement with accessible pedagogy varied considerably, affecting how well course materials and activities were designed for students with varying levels of access. Participant P09 observed:
Some lecturers are very good at designing their courses with access challenges in mind. They provide multiple formats, they upload materials early, they check regularly whether students can access. But others do not think about these issues at all.

Socio-economic disparities amongst the student population meant that whilst some students could afford personal devices, generous data packages, and even home internet connections, others struggled to meet basic access requirements. Participant FG1-P7 explained:
The inequality amongst students themselves is very visible. Some arrive on campus with the latest laptops and tablets, whilst others are sharing old devices and rationing data very carefully. These differences create different educational experiences within the same institution.

Geographic factors including students' home locations affected their ability to access digital resources outside formal campus hours. Students from townships with poor infrastructure faced greater challenges than those from more developed residential areas. Participant P23 shared:
Where you live matters a lot. I come from a high-density area where power cuts are more frequent and internet connectivity is very poor. Even if I wanted to work from home in the evenings or weekends, it is almost impossible.

National economic conditions including currency instability and inflation affected the affordability of devices and data over time. Participant P12 noted:
Prices for data and devices keep going up because of inflation and exchange rate problems. What you could afford last semester might be out of reach this semester. The economic situation makes everything harder.

Student support services were recognised as important but under-resourced. Whilst some support was available through library services and student welfare offices, dedicated support for students facing digital access challenges remained limited. Participant FG2-P2 reflected:
The university could do more to support students who are struggling with access. Maybe create a device loan programme, provide free data bundles to students in need, or offer dedicated support sessions for building digital skills.

Some positive institutional initiatives were acknowledged, including occasional provision of free campus Wi-Fi data, extension of computer lab hours during examination periods, and individual lecturers' efforts to provide printed materials as backups. However, participants emphasised that these remained piecemeal responses rather than systematic institutional strategies for ensuring digital equity.

Participant P24 summarised the overall institutional and contextual picture:
The challenges we face come from many directions. National infrastructure problems, economic difficulties, institutional resource constraints, inconsistent policies. Solving these problems requires action at multiple levels, from government investment in power and internet, to university policy and budget decisions, to individual lecturer practices.

5. DISCUSSION

The findings of this study reveal complex interactions between digital access inequalities, student experiences, academic and psychological outcomes, and adaptive resilience strategies within the specific context of state universities in Bulawayo, Zimbabwe. These findings align with and extend existing literature whilst offering contextually specific insights.

Students' experiences of accessing digital learning resources in Bulawayo universities reflect broader patterns documented in both regional and global literature, whilst also demonstrating particular intensities and configurations of barriers characteristic of the Zimbabwean context. The unreliability of internet connectivity and power supply reported by participants echoes findings from other African contexts documented by Shikali and Muneja (2024) and from Zimbabwe specifically by Nherera (2024) and Moyo and colleagues (2025). However, the present study reveals how these infrastructural challenges interact with institutional limitations and socio-economic disparities to create compounding barriers that fundamentally shape the educational experience. Whilst students in developed contexts as studied by Keane

and colleagues (2023) report gaps between expectations and institutional provision, students in Bulawayo face more fundamental questions about whether basic access is possible at all.
The finding that digital access inequalities significantly influence both academic engagement and psychological well-being aligns strongly with global evidence from Neagu and Vieriu (2025) and Michikyan (2025), regional evidence from Mateko and colleagues (2025), and local evidence from Moyo and colleagues (2025). This study extends that evidence by documenting the specific mechanisms through which access barriers create cascading negative effects. The inability to access materials timeously creates immediate disadvantages in classroom participation and assignment completion, whilst the cumulative nature of these disadvantages over time creates knowledge gaps that become increasingly difficult to close. This pattern of cumulative disadvantage has been less explicitly documented in previous Zimbabwean studies, representing an important contribution of the present research.

The psychological impacts documented including stress, anxiety, feelings of inadequacy, social isolation, and symptoms of burnout demonstrate that digital inequality is not merely a technical or logistical challenge but a significant threat to student well-being. This finding resonates with the work of Neagu and Vieriu (2025) who documented strong correlations between digital well-being and psychological well-being, and with Moyo and colleagues (2025) who noted stress and frustration resulting from connectivity issues. The present study adds depth to this understanding by revealing the emotional dimensions of digital exclusion, including guilt about financial burdens on families and self-doubt about academic belonging. These psychological consequences have important implications for student retention, success, and overall university experience.

The resilience strategies documented in this study align with patterns identified in global literature by Pan and colleagues (2024), Hassoun and colleagues (2025), and Naeem and Mushibwe (2025), in regional literature by Kajee and Balfour (2011) and Tefo (2023), and in Zimbabwe specifically by Makaye (2020) and Moyo and colleagues (2025). The prominence of peer collaboration, mobile-first learning, strategic time management, and offline strategies across all these contexts suggests these represent fundamental adaptive mechanisms that students employ when facing access constraints. However, the present study reveals particular features of resilience in the Bulawayo context, including the sophisticated scheduling strategies students develop around load-shedding timetables and the extent to

which informal peer networks function as essential infrastructure substituting for inadequate institutional provision.

An important insight emerging from this study is the dual nature of student resilience: whilst these adaptive strategies enable students to persist and succeed despite barriers, they also risk normalising systemic inequities and placing unfair burdens on individual students to overcome structural problems. This tension has been less explicitly addressed in previous literature. Students should not have to develop elaborate coping mechanisms to access basic educational resources that ought to be reliably provided. Celebrating resilience without simultaneously challenging the conditions that make such resilience necessary risks perpetuating rather than addressing fundamental injustices in educational access.

The institutional and contextual factors identified in this study corroborate evidence from Miah (2024), Martini (2025), and Barragán and Rincón (2025) globally, from Dyantyi and Mkabile-Masebe (2025) and Ajani (2025) regionally, and from Moyo and colleagues (2025), Hlungwani (2025), and Chidakwa (2024) locally regarding the centrality of infrastructure investment, policy coherence, institutional commitment, and socio-economic context in shaping digital equity. The finding that power supply represents a foundational infrastructure constraint affecting all other aspects of digital access is particularly salient in the Zimbabwean context where load-shedding has intensified in recent years. This infrastructure deficit operates beyond institutional control, highlighting the need for multi-level interventions spanning national energy policy, telecommunications regulation, and institutional investment.

The inconsistency in institutional policy implementation and the variability in lecturer practices documented in this study reflect broader challenges of institutional capacity and resource constraints faced by Zimbabwean universities. These findings suggest that whilst individual initiatives by committed lecturers and library staff are valuable, sustainable digital equity requires systematic institutional approaches backed by adequate resource allocation and clear policy frameworks. The gap between institutional rhetoric about digital transformation and actual investment in infrastructure and support systems identified by participants represents a credibility challenge that institutions must address.

The intersectionality of digital inequality with socio-economic disparities amongst students is a particularly important finding. Students enter the university with vastly different levels of

digital capital shaped by their family backgrounds, prior educational experiences, and current financial circumstances. These pre-existing inequalities are then amplified by institutional environments that assume relatively uniform access capabilities. This pattern mirrors global evidence on digital capital and stratification documented by Martini (2025) but operates with particular intensity in contexts of high economic inequality and instability such as Zimbabwe.

A limitation of this study is its focus specifically on state universities in Bulawayo, which may not fully represent experiences at other types of institutions or in other regions of Zimbabwe. Future research should examine digital access and resilience across different institutional types and geographic contexts to enable comparative analysis. Additionally, whilst this study captured student perspectives in depth, incorporating perspectives of lecturers, administrators, and policymakers would provide a more comprehensive understanding of institutional factors and potential intervention points.

6. Implications for Policy and Practice

The findings of this study have important implications for policy and practice at multiple levels including institutional, national, and international dimensions.

At the institutional level, universities must move beyond piecemeal responses to digital access challenges towards comprehensive strategies grounded in principles of equity and inclusion. This requires first conducting thorough audits of current digital infrastructure and access patterns to understand the scope and distribution of access challenges amongst the student population. Based on such audits, institutions should develop clear digital equity policies that articulate minimum access standards expected of students, provisions for students facing barriers, and lecturer responsibilities for accessible content design and delivery. These policies should be accompanied by dedicated budget allocations for infrastructure improvement including expansion of computer labs and Wi-Fi coverage, installation of backup power systems such as solar panels and battery storage, provision of device loan programmes for students in need, and subsidised or free data bundles for financially disadvantaged students.

Lecturer professional development represents another critical institutional priority. Training should focus not only on technical skills for using digital platforms but more fundamentally on principles of inclusive and accessible pedagogy that considers diverse student circumstances. Lecturers should be supported to design courses with multiple pathways for accessing content and demonstrating learning, to provide materials in various formats, and to

build in flexibility regarding submission deadlines when access challenges arise. Recognising and rewarding lecturers who demonstrate commitment to digital equity through teaching awards and promotion criteria can help shift institutional culture.

Student support services require enhancement to address digital access challenges explicitly. This could include creation of dedicated digital learning support centres staffed by personnel who can assist students with technical troubleshooting, digital literacy development, and navigation of access barriers. Peer mentoring programmes connecting students who have successfully navigated access challenges with those currently struggling can leverage the resilience strategies documented in this study whilst building supportive communities.

At the national policy level, addressing the foundational infrastructure deficits that constrain digital education requires coordinated action across government ministries and regulatory bodies. Energy policy must prioritise reliable electricity supply recognising education as a critical sector requiring uninterrupted power. Telecommunications policy should promote affordable internet access through regulatory measures that reduce data costs and expand network coverage, particularly in high-density residential areas where many students live. The government could consider subsidised internet access specifically for educational purposes or mandates for telecommunications companies to provide discounted student packages.

National education policy should establish minimum standards for digital infrastructure and support in higher education institutions, backed by dedicated funding streams. Equity considerations should be embedded in frameworks for quality assurance and accreditation, with institutions required to demonstrate how they ensure digital access for all students regardless of socio-economic background. Government scholarship and financial aid programmes should explicitly include components for digital access costs including devices, data, and connectivity.

Investment in national educational technology infrastructure such as shared digital library resources, open educational resource repositories, and learning management systems that institutions can access at reduced cost would enable more equitable provision across the sector. Such national infrastructure could reduce the burden on individual institutions to develop expensive systems independently.

Professional bodies and associations in higher education should develop and disseminate best practice guidelines for promoting digital equity, drawing on successful interventions from various contexts including those documented in this research. Regional collaboration through bodies such as the SADC Secretariat can facilitate knowledge sharing, joint advocacy for improved infrastructure, and coordination of digital education initiatives that benefit students across borders.

For development partners and international organisations supporting education in Zimbabwe and similar contexts, this research highlights the importance of infrastructure investment alongside programmatic interventions. Whilst training and capacity building are valuable, they cannot substitute for reliable electricity, adequate internet connectivity, and availability of devices. Development assistance should adopt holistic approaches that address infrastructure, policy, capacity, and financial barriers simultaneously.

Importantly, interventions at all levels must centre student voices and experiences. Meaningful student participation in policy development, implementation monitoring, and evaluation processes can ensure that solutions address actual needs and barriers as experienced by students themselves rather than as assumed by administrators and policymakers.

7. CONCLUSION

This study has provided in-depth qualitative insights into the experiences, challenges, and resilience strategies of university students navigating digital access inequalities at state universities in Bulawayo, Zimbabwe. The findings reveal that digital divides in this context are not merely technical issues but fundamental barriers to educational equity that significantly affect academic engagement, psychological well-being, and educational outcomes. Students face multiple compounding barriers including unreliable internet connectivity, inadequate infrastructure, high costs of data and devices, and inconsistent institutional support. These barriers create cascading disadvantages that accumulate over time, limiting participation, increasing stress and anxiety, and creating feelings of inadequacy and exclusion.

Despite these significant challenges, students demonstrate remarkable resilience through diverse adaptive strategies including peer collaboration and resource sharing, mobile-first learning approaches, strategic time management around infrastructure constraints, offline

learning methods, and emotional regulation. These resilience strategies enable many students to persist and succeed, but they also represent individual responses to systemic problems that ultimately require structural solutions. The burden of resilience should not fall solely on students who must overcome barriers that ought not to exist.

The study identifies critical institutional and contextual factors shaping digital inequality including national infrastructure deficits particularly in electricity and internet connectivity, institutional resource constraints and policy gaps, lecturer practices and digital pedagogical competencies, and socio-economic disparities amongst students that create vastly different access capabilities. Addressing digital inequality requires coordinated interventions at multiple levels from national infrastructure investment and policy frameworks through institutional strategies and resource allocation to pedagogical practices and student support services.

Digital equity in education is fundamentally a social justice issue. In an increasingly digital world, unequal access to digital learning resources translates directly into unequal educational opportunities and outcomes. For Zimbabwe to realise the potential of its young people and to develop the skilled workforce needed for national development, ensuring that all students can access digital education effectively and equitably must become a national priority. This requires sustained political will, strategic investment, policy coherence, and genuine commitment to equity principles..

The voices of students documented in this research remind us that behind statistics about digital divides are real people whose educational experiences, future prospects, and well-being are profoundly shaped by their ability to access the digital resources increasingly central to higher education. Listening to these voices, understanding their experiences, and acting decisively to address the barriers they face represents an ethical imperative and a practical necessity for building inclusive, equitable, and effective education systems.

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