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Impact of technology integration on students' sense of belonging and well-being: a systematic review

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ABSTRACT

As an important tool, technology supports and enhances students' educational experiences by fostering inclusive learning communities, bridging cultural gaps, and accommodating diverse learning styles. However, limited studies have demonstrated the impact of technology integration on students' sense of belonging and well-being in the context of South African higher education. This study aimed to address this gap through a systematic literature review. Published scholarly peer-reviewed articles were used to examine the impact of technology on students' sense of belonging and well-being. The technology acceptance model (TAM) and self-determination theory (SDT) were used to theorize the findings. The findings reveal that while technology provides self-directed learning, it also exacerbates inequalities and digital stress. In addition, factors affecting students' sense of belonging and well-being include the digital divide, isolation-related stress, and psychological needs due to a lack of technology preparedness, compounded by socio-economic disparities and insufficient digital skills and technical support. It is recommended that global financial, technical, and intellectual stakeholders collaborate to ensure equal access to digital resources in education. These strategies should focus on supporting user-friendly initiatives that bridge the digital gap. The study limitations include reliance on existing literature and lack of direct student feedback.

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1. INTRODUCTION

Technology integration in higher education (HE) has become an important aspect of students' learning experiences. For decades, technology has been used to transform and improve the efficiency of teaching and learning, teaching methods, learning environments, and access to education [1], [2]. In South Africa, for instance, universities strive to compete globally and drive innovation by implementing digital tools and platforms that support and enhance students' educational experiences. Education White Paper 3, the National Plan for Higher Education, and the 1999 Foresight Report underscored the need for technology in transforming HE and enhancing South Africa's global participation. In addition, with the aim of White Paper on e-Education to equip all South African learners with technology skills [3], South African universities have integrated information and communication technologies (ICTs) into their curricula. This serves as a drive to compete globally, drives innovation, and caters to digital natives seeking active learning environments, while

providing new classroom engagement avenues [4]. Studies have shown that integrating technology into the classroom has fostered inclusive learning communities, bridged cultural gaps, and accommodated diverse learning styles [5], [6] for students. Dinc [7] argued that technology has positively influenced students' engagement, motivation, digital skills, and ability to study independently and collaboratively.

However, integrating technology into HE has had a significant impact on students' sense of belonging and well-being. For instance, extant literature has highlighted some level of technology challenges for students despite its positive impact on their learning experiences [8], [9]. Technology has introduced distinct challenges and harm to students' interpersonal relationships, psychological well-being, and physical health [5], [9]. This is particularly true in a third-world country such as South Africa, with a diverse student population transitioning to HE from under-resourced technology institutions and disadvantaged socio-economic backgrounds [6]. Their limited technology skills and access to technology resources, as well as their prior experiences with digital technologies, significantly influence students' expectations and perceptions of advanced technologies suitable for university studies [6]. As such, a disconnect between students' learning expectations with technology and course engagement requirements, particularly considering the varying financial capacities of higher education institutions (HEIs) to provide supportive technology, may impact students' sense of belonging and well-being. Thus, understanding the impact of these technologies on students' learning [6], sense of belonging, and well-being is essential.

While Pedler *et al*. [10] defined sense of belonging as an individual's perception of being valued and respected by others within a group, Wahyuni *et al*. [11] defined well-being as a positive, holistic, and sustainable psychological condition characterized by positive emotions, resilience, and satisfaction with oneself, social interactions, and experiences at school. With technology integration, students' sense of belonging and well-being can be enhanced by fostering connections and communication within learning communities. This can make students feel more valued and respected and promote positive interactions and personalized learning experiences that enhance resilience and satisfaction in the online learning environment.

Previous research has primarily focused on the importance of student belonging and well-being in educational outcomes, as well as how educational policies emphasizing these factors can enhance positive and meaningful life experiences [8], [12]. However, there is a dearth of literature on the impact of technology use on students' sense of belonging and well-being [8]. For instance, Tang *et al*. [13] contended that despite the benefits of online learning, which enabled continuous engagement with learning content during and after the COVID-19 pandemic, significant issues related to the effects of technology on students' mental health, access, psychological needs, stress, well-being, and a sense of belonging have been inadequately addressed. This gap is particularly relevant in South Africa, where socio-economic disparities can exacerbate the challenges of adopting new technologies in educational settings [5], especially during a pandemic.

Although it is believed that some HEIs have inadvertently overlooked students from under-resourced technological backgrounds, as well as their levels of engagement and acceptance when integrating technology into the curriculum, it is argued that students from these backgrounds feel more connected, respected, and accepted if aspects such as interpersonal and intrapersonal communication, adaptability, stress management skills, academic commitment, well-designed online curricula, engaging learning activities, and robust technical support are considered when developing online content [13]. Hence, addressing these factors can enhance students' mental health, technological access, psychological needs, retention, and a sense of belonging and well-being.

While numerous studies have explored the use of various technologies across different life stages, most research on the impact of ICTs on well-being has focused on the link between internet use and depressive symptoms. For instance, a quantitative study conducted by Ficapal-Cusí *et al*. [14] with a sample of 543 students in Spain found that self-management and ease of use in e-learning systems directly contribute to student well-being. The research identified two pathways that reinforce well-being: i) intention to use e-learning systems enhances their ease of use; and ii) perceived enjoyment increases the effectiveness of self-management. However, the study also identified a negative pathway that adversely affects student well-being. This "path of darkness", according to the authors, emerges when technological dependence, understood as a habitual reliance on technology, interacts with perceived enjoyment, leading to negative outcomes for student well-being. As such, e-learning challenges university students due to the need to adapt to a new learning method, causing stress and undermining their well-being [14].

In light of this, studies have argued that South African HEIs should expand their focus beyond the impact of technology on learning and classroom environments and examine the implications of technology integration on students' sense of belonging and well-being, as limited research exists in this area [8], [15]. This is the focus of the current study, which is guided by one primary research question: how does technology integration in HE impacts students' sense of belonging and well-being in South African universities? To answer this question, the paper discusses the theoretical frameworks underpinning the study and presents the methodology, results, theorization of the results, and conclusion.

2. THEORETICAL FRAMEWORK

This study utilized Davis technology acceptance model (TAM) and Deci and Ryan's self-determination theory (STD) as lenses to theorize the impact of technology integration on students' sense of belonging and well-being. While integrating technology tools for learning is not inherently negative, it can become challenging when meeting these demands requires greater effort, for which students may lack adequate skills.

2.1. Technology acceptance model

Initially introduced by Davis in 1981, the TAM posits the adoption of a system (technology) based on user motivation, which is explained by three factors: perceived usefulness, perceived ease of use, and attitude toward using the system [16], [17]. Chuttur [16] posited that the user's willingness to use a system is significantly influenced by perceived usefulness and ease of use. The TAM aligns with the theory of reasoned action (TRA) and the theory of planned behavior (TPB), emphasizing the role of beliefs in shaping attitudes, which influence intentions and behavior [18].

The TAM comprises two fundamental constructs explaining how individuals accept and use technology, with perceived usefulness being determined by a complex relationship between system characteristics (external variables) and potential system usage [17]. Davis [19] defined perceived usefulness as the extent to which an individual believes that using a specific technology will enhance their performance or make their work more efficient. He further defined perceived ease of use as the belief that using technology will require minimal effort [19]. However, Ndebele and Mbodila [20] found that the effort exerted or number of resources employed by lecturers to use a system influences perceived ease of use. They utilized the TAM to explore learning and teaching in historically disadvantaged institutions in South Africa, where participants faced challenges accessing resources outside the university. The TAM's prominence in technology acceptance research highlighted a gap in understanding how cultural differences influence technology adoption and usage patterns [16]. This uncertainty raises questions about the applicability of TAM primarily developed in Western contexts to other countries or cultural settings [21].

2.2. Self-determination theory

Self-determination theory explores the motivational factors driving human behavior and well-being. SDT posits that humans are inherently active, naturally motivated, and oriented toward developing through integrative processes, striving for personal growth and development by integrating various aspects of their lives coherently. However, these inherent tendencies require supportive conditions to thrive [22]. Originating from research on the impact of extrinsic rewards on intrinsic motivation, SDT links intrinsic motivation and its social-contextual effects to basic human needs for competence and self-determination (autonomy). Deci and Ryan [23] proposed three psychological needs for learning: autonomy, relatedness, and competence. Autonomy involves an individual's sense of taking initiative and ownership of their actions, supported by experiences of interest and value and undermined by external variables [22]. In the context of cognitive evaluation theory (CET), rewards can undermine intrinsic motivation by thwarting autonomy, while choices can enhance motivation by supporting internal autonomy needs. Positive feedback supporting perceived competence enhances intrinsic motivation, while negative feedback leading to perceived incompetence undermines it. According to Ryan and Deci [22], "competence concerns the feeling of mastery, a sense that one can succeed and grow. The need for competence is best satisfied within well-structured environments that afford optimal challenges, positive feedback, and growth opportunities."

SDT focuses not only on the environment itself but also on how it fulfils people's psychological needs. When the environment enables individuals to feel competent, autonomous, and connected, their motivation for a particular task peak. Relatedness, the third psychological need, is a sense of belonging and connection facilitated by respect and care [22]. According to Rosli and Saleh [24], intrinsic motivation involves activities pursued for inherent interest and enjoyment, driving lifelong human learning. Extrinsic motivation is characterized by behaviors driven by factors unrelated to students' inherent satisfaction [24]. These elements, nurtured in structured environments, are utilized to understand the impact of technology integration on students' sense of belonging and well-being in the context of South African universities.

3. RESEARCH METHOD

The systematic literature review (SLR) was conducted using the PRISMA protocol, which requires careful documentation of review plans to avoid indiscriminate decisions. The SLR aimed to identify gaps, contradictions, and inconsistencies in the literature and provide practical guidance [25], [26]. We followed the following PRISMA protocol: identification (keywords, search criteria, database, and records extracted), screening (inclusion and exclusion), eligibility (quality assessment), and inclusion (final data included).

3.1. Identification (database search)

We conducted electronic database searches in the university library to locate relevant peer-reviewed journal articles. We searched for articles utilizing databases such as Google Scholar, the Education Resource Information Centre (ERIC), and EBSCO. We employed a variety of keywords to ensure comprehensive coverage of the topic. This included: ((“technology integration” OR “e-learning” OR “online learning”)) AND ((“impact” OR “effects” OR “challenges”)) AND ((“students” OR “learners”)) AND ((“sense of belonging” OR “sense of belongingness”)) AND ((“well-being” OR “welfare”)) AND ((“higher education”)). The initial search processes yielded 4,330 articles from Google Scholar, 615 from EBSCO, and 53 from ERIC, respectively.

3.2. Screening (selection criteria)

The selection criteria were specific and aimed to identify studies relevant to the current research. The criteria focused primarily on the PRISMA statement. The timeframe considered for this study was 2018 to 2024. Articles published before 2018 were excluded, except those relevant to the study. There was no geographical limitation for the articles included in this study. English language articles from any region that were relevant to the study were considered. At this stage, 4,249 articles were excluded, and 749 records were extracted. Additionally, book chapters, conference proceedings, review papers, SLRs, dissertations, and book series were excluded from the analysis.

3.3. Eligibility (inclusion and exclusion)

This research is based on original, peer-reviewed publications. To ensure the quality of the review, all duplicates were thoroughly scrutinized. The abstracts of the papers were carefully examined and filtered to verify the quality and relevance of the academic material included in the review process. Each piece was critically evaluated at a later stage. The second exclusion criterion was that articles had to be published only in English. This analysis resulted in the elimination of six publications written in languages other than English. Five additional publications were removed from the corpus due to duplicate records. After evaluating the articles against the inclusion and exclusion criteria, 63 articles remained. The selection process is shown in Figure 1, adapted from Moher *et al.* [27].

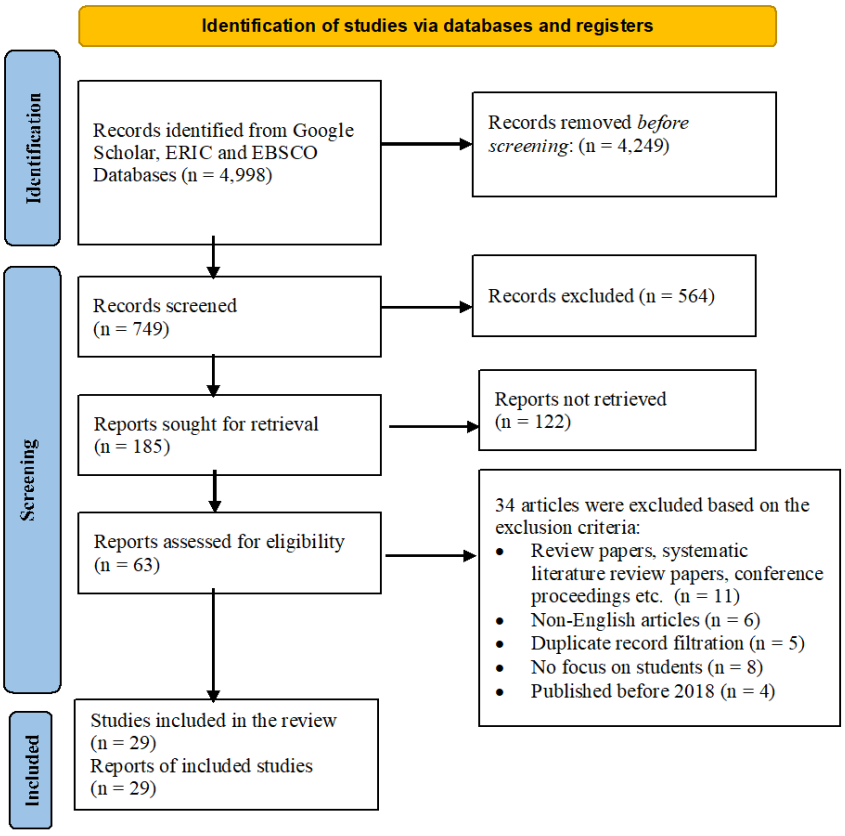

Figure 1. PRISMA flow diagram

3.4. Included (data extraction)

In the data extraction phase, 63 articles were selected based on the following criteria: i) only original peer-reviewed articles were considered because of the rigor and robustness of the scientific process; ii) articles written in English were included; and iii) articles published between 2018 and 2024. During this phase, each selected article was carefully reviewed to extract relevant data related to the study's objectives. Additionally, the extracted data were categorized into themes, and thematic organization ensured a structured analysis and comparison across studies.

4. RESULTS AND DISCUSSION

4.1. Impact of technology integration on students' sense of belonging and well-being

Technology integration in HE impacts students' sense of belonging and well-being in many ways, which include but are not limited to the following: the digital divide, students' connection to the university, perceived high levels of stress, effective communication, and online learning experiences [8]. Other pertinent impact areas include a lack of student preparedness for entry level, limited knowledge, skills in and interaction with technologies [28], resource availability, and psychological needs.

4.1.1. Digital divide and resource availability

The digital divide, defined as economic, usability, and empowerment gaps, also refers to inequalities in broadband access in lower income urban and rural areas, as well as disparities in household income that prevent lower income households from purchasing computer hardware and internet services [29], [30]. This divide has been highlighted as a concern in most of the reviewed articles in this study, underscoring its significant impact on students' learning outcomes, academic achievement, and performance in the modern era. Beyond the digital divide, resource unavailability is also a crucial factor affecting students, as both factors are closely interconnected. These inequalities were exacerbated by the swift transition to remote learning during the pandemic, which heightened preexisting challenges for students lacking essential technology infrastructure such as computers and laptops [31]. Compounding this were the three levels of the digital divide: lack of internet access; disparities in attitude, skills, and usage; and differences in internet outcomes and benefits [31]–[33]. Understanding these levels is essential for addressing the broader impacts on students' sense of belonging and well-being with technology integration. The pandemic did not expose only the "digital divide" or "digital exclusion" in areas with more impoverished or rural environments with only basic digital technology infrastructures. It also exposed the illusion of digital democracy in developed countries such as America, who believed they had overcome the digital divide decades before the pandemic, revealing that many, including students in America, also face significant barriers to digital access [30]. Thus, global digital inequality exposes disparities in technology access, required skills, and real-world benefits of being online.

One study explored how global HE leaders experienced digital transformation during the pandemic and how the promises of educational technology (ed-tech) regarding access, learning outcomes, and collaboration played out in practice. The study noted that while ed-tech promotes the idea of better access to education, it is still influenced by structural inequalities such as location, culture, facilities, and students' readiness [34], [35]. Meanwhile, research on the digital divide within minority-serving institutions has argued that limited access to online learning resources continues to widen the gap between historically advantaged and disadvantaged institutions, as well as between students from rural and urban areas in some countries. This disparity may have resulted in students not gaining the necessary knowledge, skills, and abilities, particularly due to differences in access to and proficiency in using technology [29], [33]. In South Africa, the government exerted efforts to bridge the digital divide by providing students with laptops and some universities adopting fourth industrial revolution (4IR)-style education even before the COVID-19 pandemic. Despite this, approximately 62.9% of students, especially those from historically disadvantaged institutions or backgrounds, still lack internet connectivity at home [31], [36], [37]. This lack of access puts these students at a disadvantage, depriving them of the benefits that home internet access typically provides. Even those with internet access at home still experience the challenges of dealing with expensive mobile data and poor network connections offered by cellular service providers [36].

Some articles reviewed in this study support the notion that, while many South African students possess the necessary technological skills, they still face significant challenges related to affordability and resource availability. The high costs associated with essential software and hardware, such as Wi-Fi routers, laptops, mobile phones, and data bandwidth, are major barriers [31]. Additionally, load-shedding (power outages) in South Africa exacerbate these issues. Although Wi-Fi and fiber internet typically do not require power to function, intermittent power cuts can disrupt the distribution of fiber internet, leading to temporary outages and internet instability in certain areas. In addition, students interviewed in Khoza study [38] noted how load-shedding affects their online activities. This instability may prevent students from fully utilizing the

internet's capabilities [36] and learning management systems. Consequently, students with limited access to technological resources struggle academically and experience a diminished sense of belonging and well-being [5].

Cranfield *et al*. [39] contended that the digital divide and resource availability issues have been adequately addressed. They pointed out that while these challenges have been reduced in countries such as Wales, Hungary, and partially in South Africa, South African universities took steps to reduce digital inequality during the COVID-19 pandemic. They did this by providing laptops to students without resources, offering free and limited data bundles with the help of mobile service providers, and granting free access to the university website [39]. However, many students only have access to digital equipment while on campus [39]. These efforts may not have been sufficient or sustainable post pandemic because there remains a question of whether the systems implemented during the pandemic to integrate technology into HE have continued effectively. This is particularly relevant given that many South African students only have internet access on campus. As the pandemic accelerated technology adoption in education, concerns arose about the unavailability of resources and whether students continue to benefit from these measures. The reliance on campus-based internet access underscores the persistent inequalities in online learning access after the pandemic. South African universities can mitigate these challenges by promoting mobile learning (m-learning) as a viable alternative. M-learning appears to be flexible, accessible, and feasible, providing a solution to the relatively low level of internet access in the country and allowing students access to learning platforms. Thus, this bridges the digital divide, as almost every student owns a smartphone.

4.1.2. High level of isolation-related stress, lack of preparedness and skills

Technology infrastructure may have resulted in the significant stress associated with continuous engagement with online learning platforms and digital resources, as emphasized by various scholars. Blignaut *et al*. [8] surveyed 537 students at a university in South Africa and found that technology tools and platforms have a substantial impact on students' connection to the university, perceived stress levels, and overall well-being. Moreover, the study revealed that students' stress levels, effective communication, and sense of belonging are influenced by their experiences with online learning [8]. This underscores the significance of these affective dimensions in shaping students' educational experiences, indicating that students who feel connected and supported are more likely to achieve academic success, and vice versa.

Other scholars [32], [40] have highlighted students' academic digital data as a cause for high stress levels. For instance, Faloye and Ajayi [32] found that students' stress levels are a result of anxiety caused by their unfamiliarity with using technologies for academic activities, while Sillence *et al*. [40] identified data overload, anxiety, loss of productivity, and a sense of being overwhelmed as common issues experienced by students managing large volumes of academic digital data. These data include notes, assignments, drafts, planning documents, research data, analysis outputs, lecture slides, and journal articles. The accumulation and retention of such vast quantities of digital academic material can provoke anxiety and stress, leaving students feeling compelled to manage and process these resources [13]. As technology becomes more integrated into education, many instructors provide teaching materials online and expect students to learn them quickly. This can make students feel disconnected and alone and make them feel even more isolated and anxious as they try to meet expectations without the traditional support they would have in a physical classroom. This can lower their academic performance, adding to their overall distress. In view thereof, we argue that rather than enhancing learning and fostering interactions that are essential for building relationships between students, peers, and lecturers [41], technology has, in many cases, exacerbated student isolation. This may significantly influence students' sense of belonging and well-being.

Another stress-related factor that emerged in this study is students' addiction to digital technology. Karakose *et al*. [9] found that addiction to digital technologies—such as smartphones, social media, and other innovative tools-can be as powerful and harmful as addiction to non-prescription drugs or smoking, often referred to as "new drugs". The global prevalence of smartphone addiction has reached nearly 27%, internet addiction is almost 15%, and game addiction is at 6%, highlighting the significant potential for these addictions to affect students' lives. As these technologies become increasingly integrated into students' daily lives, the pervasive use of digital technologies can result in excessive screen time, disrupted sleep patterns, and social isolation, all of which contribute to elevated stress levels. The stress associated with managing these addictions can further exacerbate feelings of anxiety, depression, and overall mental health challenges, significantly impacting students' academic performance and well-being.

Several scholars [31], [42] also noted that many learners often experience feelings of loneliness and anxiety in online learning environments, which they perceive as unfamiliar and intimidating. These negative feelings can stem from a lack of confidence in their skills, preparedness, and abilities to manage online studies, especially when dealing with software malfunctions or connectivity issues, which can further impact their mental health and sense of inclusion. Additionally, participating in online discussion forums can be

daunting for some students, contributing to these negative emotions [42]. Consequently, insufficient technical support and training can leave students feeling unsupported and marginalized, particularly those transitioning from disadvantaged institutions with limited prior knowledge and experience [40], [43]. The stress of navigating new technologies without proper guidance can significantly affect their well-being [8]. Research has argued that South African students still struggle to effectively use these tools due to a lack of prior exposure, especially students from households that are unable to afford the necessary technological infrastructure. For some, university is their first encounter with computers, leading to heightened anxiety as they adapt to new technologies [31]. This anxiety can make them feel isolated and disconnected from their more tech-savvy peers, ultimately inhibiting their sense of belonging and negatively affecting their academic success [42].

4.1.3. Psychological needs

In their study, Xu *et al*. [44] emphasized that students have fundamental psychological needs, including autonomy, competence, and relatedness. They found that fulfilling these needs helps students effectively adapt to career-related changes, which is essential for their professional development and success. However, meeting these students' needs with technology integration will depend on how technology supports these needs. This is because, as found by James *et al*. [45] in their study, factors such as technology overload and lack of experience with digital tools can undermine students' satisfaction with basic psychological needs, which are essential for their overall sense of belonging and well-being. This suggests that when students feel overwhelmed by technology or lack the skills to use it effectively, as already mentioned, their sense of accomplishment, autonomy, and connectedness can suffer [45]. These challenges underscore the importance of creating balanced and supportive digital environments that foster positive digital well-being [12]. Digital well-being is crucial for enhancing students' sense of belonging and well-being. By guiding students to use digital technologies safely and effectively, institutions can create a supportive and inclusive online environment, mitigating the risks of technology addiction and cyberbullying, which can harm students' mental health and social connections [12]. Prioritizing safety in digital education not only enhances students' well-being but contributes to a positive and inclusive educational experience [12].

According to Smith *et al*. [41], the notion of a sense of belonging has a long-established presence in psychological and educational literature, originating from Maslow's hierarchy of needs model. Karaman and Tarim [46] suggested that belongingness is a fundamental need that includes physiological needs, safety, respect, self-actualization, and aesthetic needs. Students seek connection and desire to be part of groups or communities to satisfy this need. Without a sense of belonging, they may experience loneliness, exclusion, rejection, and a lack of friendship. This need is vital for survival and a healthy life [46]. In technology use, these needs are important for connecting, feeling valued, and valuing others. Peacock and Cowan [42] found that students' sense of belonging in an online educational environment is important because it helps them form strong connections and meaningful relationships with their lecturers and peers. This sense of belonging assists students in developing confidence, self-efficacy, and self-esteem, which are crucial for achieving their personal and professional goals within a technology framework.

4.2. Theorizing the impact of technology integration on students' sense of belonging and well-being

The study, examining the impact of technology integration on students' sense of belonging and well-being, is grounded in two theoretical frameworks: the TAM and SDT. The widespread adoption of technology in education significantly shapes students' learning experiences. The TAM, which focuses on perceived usefulness and ease of use, offers crucial insights into how these perceptions influence student engagement and emotional responses, thereby affecting their connection to the academic community and psychological well-being [47]. Through the lens of the TAM, the study highlights how challenges such as the digital divide, resource limitations, lack of digital skills, and psychological stress negatively impact students' perceptions of technology's usefulness and ease of use. These issues hinder technology adoption, particularly among marginalized students, and underscore the complexities of achieving true inclusivity through technology alone. The findings suggest that comprehensive strategies addressing these barriers are essential for effective and inclusive technology integration in education.

Various studies [7], [8], [48] have found that technology-mediated learning can enhance student engagement, improve learning outcomes, and provide greater flexibility in accessing educational resources. It can also promote inclusivity and accessibility by addressing diverse learning needs, fostering a supportive environment, and creating inclusive learning communities that bridge cultural gaps and accommodate diverse learning styles. However, this study found that despite these benefits, technology integration has introduced distinct challenges and harms to students' interpersonal relationships, psychological well-being, and physical and mental health [5], [6], [9]. This contradicts SDT, which emphasizes the importance of fulfilling basic psychological needs-autonomy, competence, and relatedness-for overall well-being. Hence, the negative effects of technology integration, such as harm to mental health and strained relationships, suggest that these

psychological needs may not be adequately met. This highlights the need for balanced approaches to technology use in education within a technology-mediated learning environment.

Furthermore, the psychological need for relatedness is essential, as students who feel connected to their peers and learning environment are more likely to experience enhanced well-being and motivation. In addition, SDT underscores the importance of autonomy in the educational context, emphasizing the need for initiative and ownership that empower students and support their sense of competence [23]. Universities should leverage technology to strengthen these connections through consistent communication and community-building efforts [49], [50]. In addition, the digital stress and inequalities that arise from technology use cannot be overlooked. Students are more likely to experience higher well-being when their autonomy, competence, and relatedness needs are met [23]. Therefore, the thoughtful integration of technology, supported by effective policies, is crucial for fostering a positive learning environment that enhances students' sense of belonging and well-being.

5. CONCLUSION

The study found that technology-mediated learning boosts student engagement, improves outcomes, and provides flexibility in accessing resources. It also fosters inclusivity and accessibility by addressing diverse needs, creating supportive environments, and bridging cultural gaps. However, research has provided evidence that key factors affecting students' sense of belonging and well-being in South African HEIs include the digital divide, high levels of isolation-related stress, and a lack of preparedness and skills. These challenges are compounded by the socio-economic disparities and insufficient technical support experienced by these students, which is reflected in many ways, including the students experiencing feelings of detachment and anxiety. Addressing these issues requires a comprehensive understanding of technology's impact and targeted interventions to promote positive digital well-being and academic success.

The scientific value of this study is the possibilities that lie in examining manifold sets of secondary data and the conclusion. The results of this study hold significant implications for future research, especially for nations facing comparable socio-economic disparities in digital access. The challenges identified in this study, such as limited access to technology, digital literacy gaps, the psychological impact of technology overload, and informed technology policies, are relevant to many other developing countries. This study emphasizes the necessity of global educational strategies that promote equitable access to digital resources, comprehensive technical assistance, and initiatives to narrow the digital gap. By tackling these challenges, countries can improve students' sense of belonging and well-being, cultivating more diverse and efficient educational settings. Future research should also analyze existing educational technology policies and their effectiveness in addressing digital divides and promoting well-being. Recommendations for policy improvements can ensure that technology integration is equitable and supportive of all students.

This study had several limitations. First, it focused primarily on the South African context, which may limit the generalizability of the findings to other regions with different socio-economic and technological landscapes. Second, the study relied on existing literature and secondary data, which may not fully capture the current and rapidly evolving state of technology integration in education. Lastly, the study did not include direct feedback from students, which could provide more nuanced insights into their experiences and challenges with technology.

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