

Managing Digital Transformation in African Higher Education Institutions: Challenges and Opportunities

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Abstract: Digital transformation in African higher education institutions is a complex and multifaceted process that requires deliberate investment, meticulous planning, and collaboration. This article analyses African higher education institutions' challenges in incorporating diversity, equity, and inclusion into their digital transformation efforts. These challenges are grouped into three categories: digital infrastructure; diversity, equity, and inclusion; and policy and framework. The research highlights the hurdles involved in this process. The research underscores the challenges of African higher education institutions in integrating digital transformation into digital infrastructure. Digital infrastructure and leadership are critical in integrating diversity, equity, and inclusion to achieve digital transformation. Digital technologies can provide accessible, high-quality education that contributes to social development and benefits all African students and staff. This approach optimises the positive impact of digital technologies by ensuring that the benefits are equitably shared throughout the continent and



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improving learning outcomes, accessibility, and the development and competitiveness of Africa's institutions globally.

Keywords: Digital transformation; Diversity Equity and Inclusion (DEI); African Higher Education, Organisation sustainability, Sustainable Developmental Goals (SDG)

Gestion de la transformation numérique dans les établissements d'enseignement supérieur africains : Défis et opportunités

Résumé: La transformation numérique dans les établissements d'enseignement supérieur en Afrique est un processus complexe et multidimensionnel nécessitant un investissement délibéré, une planification minutieuse et une collaboration. Cet article analyse les défis rencontrés par les établissements d'enseignement supérieur africains pour intégrer la diversité, l'équité et l'inclusion dans leurs efforts de transformation numérique. Ces défis sont regroupés en trois catégories : infrastructure numérique ; diversité, équité et inclusion ; et politique et cadre de référence. La recherche met en évidence les obstacles associés à ce processus. Elle souligne notamment les défis auxquels sont confrontés les établissements d'enseignement supérieur africains pour intégrer la transformation numérique dans leurs infrastructures numériques. L'infrastructure numérique et le leadership jouent un rôle clé dans l'intégration de la diversité, de l'équité et de l'inclusion, afin de réaliser la transformation numérique. Les technologies numériques peuvent offrir une éducation accessible et de qualité, contribuant au développement social et profitant à l'ensemble des étudiants et du personnel africains. Cette approche optimise l'impact positif des technologies numériques en veillant à ce que les avantages soient équitablement partagés sur tout le continent, tout en améliorant les résultats d'apprentissage, l'accessibilité, ainsi que le développement et la compétitivité des institutions africaines au niveau mondial.

Mots-clés: Transformation numérique ; Diversité, Équité et Inclusion (DEI); Enseignement supérieur africain, Durabilité organisationnelle, Objectifs de Développement Durable (ODD)

Introduction

Higher education institutions are under immense pressure due to global competition for students, demographic shifts, financial constraints, changing labour market needs, and students' heightened expectations for innovative learning, teaching, research, and management experiences. Specifically, African Higher Education Institutions (AHEIs) are adopting digital transformation strategies to address these pressures. They use digital transformation to enhance their existing operations and digitise current processes, while simultaneously creating new digital approaches, establishing new digital models, or completely digitalising existing processes. Despite their efforts to drive digital transformation, AHEIs are falling behind their counterparts in the developed world, particularly in implementing diversity, equity, and inclusion (DEI). Regardless of the digital transformation strategy, AHEIs face numerous challenges, particularly when implementing DEI.

Globally, AHEIs are falling behind in implementing digital transformation to improve higher education digital capabilities and promote continuous learning that is inclusive for all (Muftahu, 2020). The assumption is that DEI are intrinsic in African society and universally understood, but this is inaccurate (Ozturgut, 2017). AHEIs seek to meet the needs of their communities and global contexts through specialised education that integrates teaching, research, and participation in community service while also:

- Considering the intricate challenges of globalisation and a multicultural world;
- Redefining diversity to encompass all aspects of human difference; and
- Aligning DEI initiatives with local, national, and global issues (Ozturgut, 2017).

A lack of coordination between DEI initiatives and digital transformation implementation obstructs efforts to achieve sustainable change in AHEIs.

Previous research on integrating DEI initiatives lacks a worldwide perspective and a broader context encompassing AHEIs. Additionally, prior studies in the academic literature on DEI for students with disabilities in AHEIs highlighted the low levels of participation among students with disabilities, as well as among both academic and non-academic staff (Siri et al., 2022).

Integrating DEI when implementing digital transformation in AHEIs is crucial to cater to students' needs. Although digital transformation aids teaching and learning, it does not automatically advance DEI in AHEIs (Tsegay, 2016).

Therefore, it is vital to integrate DEI when implementing digital transformation to ensure fair access to quality education and improve future living conditions.

Establishing a digital infrastructure must align with the educational policies of AHEIs. Many AHEIs mainly use digital transformation to enhance teaching and learning without effectively promoting inclusion and educational equity. There is an urgent need to integrate DEI when implementing digital transformation by establishing strong infrastructure and creating innovative learning environments

to address evolving educational needs (Alenezi, 2021). Lusigi (2019) proposed that more research should be done to tackle DEI when implementing digital transformation, focusing on overcoming barriers through technology in AHEIs. Therefore, the foundation for the research objective is to provide an understanding of the challenges and opportunities of integrating DEI and implementing digital transformation in AHEIs.

Research Questions

- *What is the understanding of DEI when integrating digital transformation?*
- *What challenges and opportunities exist when integrating DEI and implementing digital transformation in AHEIs?*

Theoretical Framework

Kurt Lewin formulated the Theory of Change in the 1940s, the foundational theoretical framework for this research because of its straightforward approach. The theory underscores the criticality of understanding how individuals are impacted by change and their surrounding environment to forecast the success of the implementation (Woody, 2020). The Theory of Change focuses on bridging the gap between interventions or initiatives to realise their intended objectives. This is achieved by pinpointing the long-term goals and then tracing backwards to identify all the conditions (outcomes) that must be in place for those objectives to be met. These essential conditions are captured within an

outcome framework, which is instrumental in determining the specific type of action or intervention required to meet long-term goals.

The Theory of Change is essential for AHEIs as they navigate through planning, implementing, and assessing their social impact initiatives, particularly efforts to integrate DEI into digital transformation. This framework acts as a strategic map, shedding light on how effective the DEI strategies are when applied to digital transformation projects for AHEIs' stakeholders. The Theory of Change serves not only to justify the integration of DEI into digital transformation initiatives to participants but also to ensure the integration is supported by ongoing, clear, consistent, and constant communication (Kristiansen & Bloch-Poulsen, 2017).

The Theory of Change fosters a collective understanding of change when implementing initiatives among various stakeholders and professional groups, leading to participation, strategic or operational cohesion, and structured approaches for oversight, assessment, and learning (Gates et al., 2024). However, to fully realise its benefits, the Theory of Change must be diligently integrated into everyday practices and consistently refined with input from stakeholders. The true aim of the Theory of Change is to act as a flexible, evolving blueprint that guides the facilitation of continuous improvement and learning and assists in pinpointing the challenges and opportunities in integrating DEI with digital transformation for AHEIs. By adopting a well-designed data strategy that is in harmony with the Theory of Change, AHEIs can

accelerate the achievement of their mission and reach their objectives with greater efficiency.

The Theory of Change offers a great framework for integrating DEI into the digital transformation implementations in AHEIs. The Theory of Change highlights the importance of simplifying the change process, promoting collaboration, and addressing resistance within AHEIs. Successfully integrating DEI in the implementation of digital transformation involves recognising the challenges and developing strategies to overcome them before initiating changes within AHEIs. The Theory of Change is well suited for AHEIs because it is easy to apply to various situations and helps individuals understand the need for change, thus reducing resistance to change and promoting longer-lasting change (Nwoga, 2023).

The Theory of Change comprises three stages, which initiate the change process by examining current processes, identifying necessary changes, and effectively communicating these changes to all stakeholders within the AHEI (Bakari et al., 2017). The three stages are unfreeze, change, and refreeze. During the unfreeze stage, the AHEI acknowledges the need for DEI in digital transformation due to existing gaps in practices and experience. During the change or movement stage, digital transformation is implemented with continuous communication of the benefits of change to all stakeholders. In the refreezing stage, the results are evaluated, and successes are celebrated (Tracy, 2020). During this stage, the AHEI expects the adoption of inclusive behaviours

after DEI training and anticipates a cultural shift toward a more inclusive learning environment through the presence of resource groups and diversity councils. However, the current approach to implementing the DEI programme in AHEIs has not produced the desired results (Nwoga, 2023).

The Theory of Change was appropriate for this research because it addresses the research objective by highlighting DEI's strategic and sustainable integration in implementing digital transformation in AHEIs. When the Theory of Change is applied to DEI, it underscores the need for deliberate integration of DEI in digital transformation implementation, highlighting its significance within AHEIs. This theory is appropriate for this research because it presents a simple and practical approach to addressing the research objective: identifying the challenges and opportunities in integrating DEI when implementing digital transformation in AHEIs.

Research Methodology

This conceptual research was conducted using a qualitative research methodology to provide an understanding of the challenges and opportunities of integrating DEI and implementing digital transformation in AHEIs. Qualitative methods are used because they are consistent with conceptual research (Ibrahim et al., 2024), which develops an initial understanding through a second data set. This research explored the challenges and opportunities of integrating DEI when implementing digital transformation in AHEIs. Secondary data, defined

as information collected by someone other than the investigator (Ruggiano & Perry, 2017), includes official documents, scholarly articles, and government figures.

Given the extensive scope of the investigation, it was considered appropriate to rely on secondary data from trusted sources for the essential context, AHEIs, to address the research objective and answer the research questions. Das et al. (2023) observed that leveraging preexisting data can offer advantages over collecting new information, which is often resource-intensive.

The review of secondary data went through three critical stages: planning the analysis, executing the review, and documenting the results. The research was methodically prepared for and executed in each phase of this process by identifying, evaluating, and synthesising research articles, reports, papers, and documents that discuss challenges and opportunities when integrating DEI and implementing digital transformation in an African context. Inductive thematic analysis was used to analyse secondary data sources from academic journals, government reports, and industry publications. The inductive thematic approach fully addressed the research objective by answering the research question.

Results and Discussion

Digital Infrastructure

The main challenge in digital infrastructure is the digital divide for AHEIs. Numerous African nations face limited connectivity and network infrastructure challenges, leading to inadequate access to digital resources. This problem is particularly acute in rural areas with limited access to electricity and essential services. In addition, students with disabilities and those of low socioeconomic backgrounds face obstacles. This situation underscores the digital divide between different regions and populations. The digital gap in Africa is attributed to several factors, including the lack of appropriate digital infrastructure and products, the lack of technical skills required to benefit, and the financial cost of digital transformation relative to people's living standards (Tsegay, 2016).

As vital as digital transformation is, it has created an educational divide within and between countries when it is not implemented with DEI. This divide results from inadequate digital infrastructure, limited technical skills, and the affordability of digital technology within and between local and regional AHEIs. The challenge of the digital divide, especially in rural areas and among disadvantaged populations, hinders the implementation of DEI to digital transformation in AHEIs. The digital divide continues to pose a significant and formidable obstacle for numerous AHEIs. Substantial disparities in the geographical availability of internet infrastructure deny access to information,

knowledge, and networks to tens of millions of people, particularly in Africa. Equally pressing is the insufficient investment in information technology infrastructure at the institutional level, with Africa notably falling significantly behind (Zezeza & Okanda, 2021).

A primary barrier to implementing DEI and embracing digital transformation in digital infrastructure is human resistance to change, which presents a significant challenge for AHEIs. Resistance to change mainly stems from the adjustment to new educational approaches (Rodríguez-Abitia & Bribiesca-Correa, 2021). There is a crucial need to provide faculty members with guidance and a positive perspective on technology, especially when implementing DEI. Despite its importance, faculty members have no guidance or orientation to help them recognise the benefits of technology, especially when incorporating DEI into their AHEI.

A significant challenge with digital infrastructure is the low levels of digital literacy and the lack of capacity-building opportunities within AHEIs. The issue of digital literacy, which is closely connected to infrastructure and technology and incorporates DEI, extends to staff and students, and can be attributed to deficiencies in institutional leadership (Bossu et al., 2023). In this sense, academic staff often lack the digital skills to use technology effectively for teaching and learning. Supportive structures are also deficient in using digital tools within AHEIs, which requires attention. The primary challenge here is the scarcity of digital technology talent, as evidenced by the low levels of digital literacy

among faculty and all stakeholders (Trifonov & Shorokhova, 2019). The challenges lie in a notable shortage of qualified personnel capable of effectively maintaining and managing digital transformation and effectively integrating DEI in digital transformation in AHEIs (Tsegay, 2016).

Implementing digital initiatives is a challenge to digital infrastructure. A primary challenge facing AHEIs is adapting to new teaching methods, learning environments, and educational models. The increased emphasis on digital transformation has led AHEIs to undertake various digital initiatives and adopt various approaches. The danger often lies in implementing digital initiatives in isolation or with an excessive focus on technology, causing resource competition, inefficiency, and conflicts (Raab & Griffin-Cryan, 2011).

This challenge becomes even more pronounced when the DEI principles are implemented in the digital transformation. Implementing digital initiatives exposes the challenge of inadequate digital infrastructure and facilities. Numerous AHEIs face a shortage of digital infrastructure and facilities and struggle with limited budgets to acquire new digital devices (Tsegay, 2016). Economic constraints, technical challenges, and other factors often prevent students and teachers from owning digital tools, including computers, which is challenging when implementing DEI and driving digital transformation in an AHEI.

Meeting students' new expectations and needs is another challenge with digital infrastructure. Students are showing a growing desire for improvements in their educational experience, including digitising administrative procedures and

ensuring round-the-clock access to information and services through various digital platforms or curricula (Rodrigues, 2017). Consequently, this challenge of choosing the right digital approach that caters to these students' needs is crucial for enhancing the overall student experience when implementing DEI, which is a key driver of digital transformation in AHEIs.

The final and most critical challenge with digital infrastructure is cybersecurity for AHEIs. As education and student experiences integrate across the digital, physical, and social realms, the imperative to ensure data protection and privacy intensifies for many AHEIs. The growing dependence on digital technologies coupled with the expanding connectivity of various aspects amplifies cybersecurity risks, compliance, data protection, regulations, and safeguarding personal data, especially for students within an AHEI (Zezeza & Okanda, 2021). Automating business processes and digitising data can improve agility and substantially increase risks and threats related to cybersecurity (Rodrigues, 2017). Meeting the necessary compliance criteria and ensuring information security is an ongoing and complex endeavour for many AHEIs. It is a challenge because the standards that should be adhered to are continually evolving, and malicious actors, including hackers and insiders with harmful intentions, continuously develop new tactics to compromise and steal critical information, especially when implementing DEI to drive digital transformation.

The lack of strategic vision is a challenge for leadership at AHEIs. Although DEI is vital for effectively operating AHEIs, these institutions often lack a well-

defined strategic vision to integrate DEI principles into their digital transformation initiatives (Rodrigues, 2017). The challenge is often experienced due to a lack of leadership and a specialised team capable of effectively outlining and implementing DEI plans when driving digital transformation. The introduction of digital transformation has exposed the lack of leaders in AHEI with digital leadership skills. The introduction of digital leadership has fundamentally altered the dynamics between leaders and their constituents within individual AHEIs and in interactions with other institutions. This change presents a notable challenge. Today, the leadership of AHEIs involves administrative and faculty responsibilities in digital environments. The role encompasses administrative digital leadership and electronic leadership at AHEIs.

Consequently, there is often a lack of supportive institutional structures to facilitate these developments (Bossu et al., 2023), leading to implementation delays (Smith & Beretta, 2021). Moreover, the delays are often compounded by the intricate bureaucratic structures of AHEIs, primarily because institutional leaders may not fully grasp the importance of DEI when driving digital transformation. Decentralised decision-making also highlights the challenge of lack of institutional leadership and communication priorities in leadership in AHEIs.

Emphasis is often placed on pressing, short-term issues rather than long-term significance (Rodríguez-Abitia & Bribiesca-Correa, 2021). Academic leadership tends to prioritise inappropriate measures of prestige, such as

financial considerations and metrics, which were identified as the most prevalent perceived obstacle (Bossu et al., 2023). These institutions tend to favour immediate results over making substantial, time-consuming investments in building essential capabilities. Prioritising primary concerns over long-term strategic investment is influenced by a focus on financial and metric-driven success measures, which hinders the successful implementation of DEI in digital transformation. Furthermore, digital transformation plans are often not carried out in a novel or adequately funded manner, further complicating the DEI implementation process.

The financial and technological constraints are a challenge for AHEIs. Securing funding for digital tools and initiatives is costly for most AHEIs. Significantly, the weak sustainability of many current interventions is based on external financing (Lusigi, 2019). This financial hurdle is prominent in various aspects, including digital infrastructure and the development of digital literacy, and becomes especially significant when funds are not allocated to improve digital skills, hampering the effectiveness of DEI implementation within digital transformation. Financial restrictions pose a substantial barrier to participating in events and contribute to social disparities (Bossu et al., 2023). The financial challenge is closely related to the fact that emerging technologies are often expensive, and this cost is coupled with the financial constraints that impede their adoption. Furthermore, AHEIs face difficulties accessing the necessary

technologies for their strategies due to restricted availability or because these technologies have not yet reached an ideal maturity level.

AHEIs experience financial and technological constraints related to the challenge of customising digital technologies, which involves significant expenses when acquiring and customising existing technologies. Furthermore, the foundation of this technology is based on costly initial investments in digital infrastructure involving public and private institutions, which is a challenge for many AHEIs. The primary reasons behind the under-investment in customising digital infrastructure and systems are traced back to the lack of institutional incentives for such investments and a failure to capitalise on opportunities for public-private partnerships to drive digital transformation. Current initiatives depend highly on external funding and struggle to scale up even smaller successes, undermining long-term sustainability (Lusigi, 2019). Furthermore, the lack of innovation and inadequate financial resources further challenge the implementation of DEI in planned digitisation efforts that drive digital transformation (Rodrigues, 2017).

A common issue for AHEIs regarding financial costs is their tendency to adopt a narrow perspective when assessing the return on investment for digital initiatives, particularly when implementing DEI in digital transformation. These institutions often make mistakes in evaluating the business case, especially when considering the long-term and challenging-to-quantify benefits of basic digital skills. For example, AHEIs overlook the value of saving faculty time and reducing

operational costs through efficiency and automation. They also do not recognise the importance of DEI in improving student enrolment, retention, and timely graduation rates resulting from an improved student experience. Furthermore, the outbreak of the COVID-19 pandemic forced AHEIs to integrate digital tools and technologies to adapt to changing circumstances to sustain educational delivery. However, integrating DEI into implementing appropriate digital tools for driving digital transformation has presented a particular challenge.

Diversity, Equity, and Inclusion

The concept of DEI is a challenge for AHEIs, particularly in regional and global partnerships that aim to facilitate digital transformation. AHEIs often lack a comprehensive understanding of DEI and its importance in digital transformation. Unfortunately, digital transformation is frequently not harnessed to advance DEI, raising issues related to technology and digital infrastructure that are common barriers to AHEIs. These include challenges such as limited internet access and a shortage of essential hardware, such as computers and smartphones (Tsegay, 2016).

Another significant obstacle to the successful integration of DEI into digital transformation is the generation gap between students, often considered digital natives, and faculty, who must adapt and learn to use these technologies (Alenezi, 2021). It is important to note that today's students at an AHEI encompass a broader age range, extending beyond traditional young adults

(ages 18 to 25) (Rodrigues, 2017). Younger generations generally have more digital skills compared to older generations.

Furthermore, while an AHEI is inherently dynamic and technologically inclined, its diverse stakeholders include students, faculties, and staff from diverse backgrounds. These diverse stakeholders exhibit different behaviours with technology, which becomes a challenge when implementing DEI in digital transformation (Rodrigues, 2017).

It should be noted that digital leadership plays a pivotal role in successfully implementing DEI when adopting information systems for digital transformation (Tungpantong et al., 2021). The challenge lies in the inadequate digital leadership skills in AHEIs as they strive to integrate DEI into digital transformation. The implementation of digital leadership is shaped by multiple factors, including subordinate satisfaction and the educational context (Bogler et al., 2013). Leaders in the digital realm are not equipped with strategic thinking abilities to integrate technology into teaching and learning (Arnold & Sangrà, 2018), which is essential for successful digital leadership in AHEIs. Decentralised decision-making has become a challenge for leadership in many AHEIs. Decentralised decision-making results in slowdowns when executing significant decisions and initiatives related to integrating DEI into digital transformation (Smith & Beretta, 2021). The persistence of complex administrative and bureaucratic structures poses a significant problem in AHEIs. This institutional

challenge emerges because institutional leaders often lack appreciation of the importance of DEI in the context of digital transformation.

Inequality is a prevalent issue within African countries, and this includes gender-based disparities in terms of access to AHEIs. Although considerable global efforts have been made to promote equal enrolment of women and men in higher education, Africa remains lagging. The ratio of women to men enrolled in AHEIs is just seven women for every ten men (World Bank, 2015). Compared to other regions, Africa has the lowest level of gender parity, even behind the Middle East, which has already achieved a more balanced representation. This imbalance has detrimental consequences, particularly for skill development across the population in emerging jobs that demand higher skill levels, affecting both women and men (Lusigi, 2019), and poses the challenge of effectively implementing DEI to facilitate digital transformation for many AHEIs.

Disability segregation and centralisation are significant challenges in DEI when implementing digital transformation in AHEIs. During the colonial era, formal education for people with disabilities was provided primarily by charitable and religious organisations, often in residential facilities away from their families and communities (Sarton et al., 2022). The education offered was typically limited to vocational skills such as jewellery making, basket weaving, or woodworking, unlike the academic curriculum found in AHEIs. This reinforced the false belief that people with disabilities were incapable of engaging in academic education, leading to their segregation.

In the post-colonial era today, many African countries still maintain highly centralised educational systems with a lack of lecturers and school-level autonomy. They often rely on a uniform, one-size-fits-all curriculum, which hinders the local, needs-based adaptation of educational programmes for people with disabilities, posing a significant challenge when implementing DEI within the digital transformation framework (Sarton et al., 2022). There is limited participation of individuals with disabilities when implementing DEI, especially when driving digital transformation with a specific focus on students with disabilities (Siri et al., 2022).

Resource limitations disadvantage students with visual, auditory, intellectual, and mobility impairments, which poses a significant challenge in achieving DEI, especially in digital transformation. Unfortunately, the onus often falls on students to adapt to inadequate provisions. Most AHEIs were not designed for people with disabilities in mind. They may not be easily accessible or adaptable to meet their specific needs, including wheelchair accessibility and digital tools and initiatives designed for people with disabilities. This lack of provision leads to isolation and frustration for learners with special needs and disabilities because they lack the necessary support and resources for meaningful DEI, particularly within the digital transformation framework (Sarton et al., 2022). As a result, students with disabilities and those of low socioeconomic backgrounds face challenges in AHEIs.

Policy and Framework

Several AHEIs officially integrated digital transformation into the 21st century; unfortunately, some AHEIs lack well-defined policies to implement DEI when driving digital transformation. Many AHEIs lack a coherent institutional and national policy framework for digital transformation. Their digital transformation aims to improve teaching and learning rather than actively promoting DEI (Tsegay, 2016).

Most AHEIs have not yet established the policies, strategic plans, and investment frameworks necessary to promote science and technology growth. These are crucial to advancing innovation, and ensuring high-quality education is a challenge when implementing DEI in digital transformation. Due to the ineffective enforcement of intellectual property rights, the inadequate legal and regulatory systems, and the absence of a comprehensive approach to public and private investments in research and innovation, many African researchers and graduates seek employment opportunities elsewhere, significantly impacting AHEIs. This outflow of human resources and skills hampers the continued progress of AHEIs and deprives the economy of the skilled labour it requires (Lusigi, 2019).

Despite Africa's wealth in fossil fuels and renewable energy resources, a significant portion is grappling with an electricity crisis. Consequently, by 2030, about 600 million inhabitants will remain without electricity, and this lack of

power will not be eradicated even by 2040. Shockingly, around 70% of the population lacks access to electricity, with disparities observed between different countries and within urban and rural areas, which presents a great challenge to AHEIs. Given that a substantial portion of Africa's population resides in rural areas, the impact of this electricity deficit is substantial. This poses a significant challenge to the successful integration of DEI. Implementing digital transformation heavily depends on a reliable power supply for effective and efficient use (Tsegay, 2016) and ensuring widespread access to connected digital devices and their integration into AHEIs.

The situation remains challenging, and achieving crucial aspects of DEI in digital transformation, such as ensuring widespread access to electricity, remains a formidable task for many AHEIs (Tsegay, 2016). A lack of commitment from the government to prioritise DEI within the digital transformation framework is a challenge for AHEIs. As a result, many governments have not provided sufficient funding to acquire the digital infrastructure and resources needed to develop effective strategies and policies for integrating DEI in the digital transformation of AHEIs. Moreover, some governments express concerns about the potential misuse of digital tools, particularly the internet, for political instability and acts of terrorism. Consequently, they may not fully invest in its development or impose strategies to control its usage (Tsegay, 2016), which poses a significant challenge to effectively implementing DEI in digital transformation in AHEIs.

Recommendations and Suggestions for Overcoming Challenges

To effectively address these challenges, leaders in the digital realm within AHEIs should cultivate strategic thinking skills related to integrating technology for educational purposes. This strategic perspective is vital to maintaining effective leadership in the virtual environment, a fundamental aspect of digital leadership. Given the ever-evolving nature of technology, these digital leaders should undergo regular training to stay current on digital leadership skills. Digital leadership involves the skills, attitudes, knowledge, and experience necessary to incorporate DEI when facilitating digital transformation.

Tungpantong et al. (2021) highlighted that the amalgamation of factors contributing to digital leadership comprises seven critical areas: vision, leadership, digital literacy, adaptability, management skills, creativity/innovation, and collaboration. Leaders with these attributes play a pivotal role in effectively implementing DEI when using technology, thus improving the efficiency of digital transformation goals. Digital leadership is a critical component and, when managed effectively, contributes significantly to the successful implementation of DEI during the adoption of digital transformation. Digital leadership allows for more efficient strategising, planning, and execution that considers the importance of each factor. Successful digital leadership requires strategic thinking to integrate technology, and it plays a crucial role in the effective execution of DEI in the context of digital transformation information systems in AHEIs. For AHEIs, digital leaders must develop their digital strategic thinking skills

to facilitate the incorporation of technology into teaching and learning (Arnold & Sangrà, 2018).

Establishing a prioritisation plan for digital investments, essentially creating a roadmap that guides the step-by-step transformation process, can help manage the issues of institutional leadership and communication prioritisation (Rodríguez-Abitia & Bribiesca-Correa, 2021). A well-defined strategic vision to implement DEI while adopting digital transformation will greatly facilitate this roadmap. Leadership requires an articulated strategic vision that is well understood by the entire team and stakeholders, promoting their active involvement and commitment to the process in AHEIs. A well-defined strategic vision helps to overcome the challenge of decentralised decision-making by enabling a roadmap with a centralised and controlled digital system for more effective decision-making (Rodrigues, 2017). It provides a crucial means of balancing the scale and speed of coordinated decision-making.

Achieving success requires the creation of a flexible and adaptive organisational model that can effectively implement DEI in the context of digital transformation. This model should aim to strike a more effective balance between maintaining distinct components and integrating them over time (Smith & Beretta, 2021). A well-defined strategic vision solves the issue of institutional leadership and communication priority and provides the remedy for the absence of a coherent institutional and national policy framework. This vision should involve the team and stakeholders, fostering their active participation and

commitment to implementing DEI while adopting digital transformation. Achieving this requires strong leadership and a dedicated team capable of confidently explaining and executing their plans.

According to Rodrigues (2017), it is through establishing a strategic vision that unifies the entire institution and formulating policies that DEI can be integrated into digital initiatives. There should be a clear long-term vision and policy deeply ingrained in the national development strategy, including using technology to improve equity, accessibility, and educational quality effectively. Overcoming the challenge of implementing digital initiatives requires establishing a suitable framework for their management. AHEIs face the demand for offering fresh and innovative digital experiences to their stakeholders. They should take a comprehensive approach, considering DEI when driving digital transformation by applying digital thinking to all aspects of their operations and internal processes, and how they fulfil their core mission. A framework that allows them to manage all digital initiatives and strategies holistically and cohesively should be adopted.

As proposed by Rodrigues (2017), this framework should encompass the following three critical components of a digital strategy:

- Core processes that contain essential functions such as research, administration, and education;

- Emerging technologies that include artificial intelligence, cloud computing, social networks, big data, mobile applications, augmented and virtual reality, the Internet of Things, blockchain; and
- Stakeholders that include administrators, faculty, students, industries, alumni, and society.

By considering and integrating these elements within the framework, AHEIs can better navigate the digital landscape and fulfil their evolving educational mission while ensuring inclusivity and diversity. Instituting a change in institutional and academic culture, coupled with a formal acknowledgement of the value of integrating DEI into digital transformation, will help overcome resistance to change. Attitudes within institutions and academia can be deeply entrenched, but altering the status quo can be achieved through a cultural transformation that promotes openness. Awareness raising can be accomplished effectively through training and mentoring initiatives.

Furthermore, if the successful implementation of DEI in digital transformation was associated with greater recognition and academic prestige, this could stimulate institutional change, as Bossu et al. (2023) suggested. The leaders of AHEIs will encourage their staff to promote the vision of digital maturity, using small pilot projects as practical examples to illustrate the potential for change. It is essential to guide educational professionals and cultivate a positive perspective on technology, particularly in implementing DEI. If managed effectively, incorporating innovative teaching methods and learning tools can address digital literacy challenges and lack of capacity-building

opportunities. Innovative teaching methods and learning tools include video conferencing, digital platforms, simulation-based learning, and collaborative learning, all of which should be customised to meet the specific needs of learners.

AHEIs are under increasing pressure to align with global advancements encompassing DEI, which requires fresh approaches and teaching and learning settings. Since today's students are considered digital natives, educators are urged to be more creative and resourceful in enhancing their digital teaching skills (Alenezi, 2021). Adapting or customising existing models to meet students' evolving expectations and requirements in AHEIs addresses the challenge of adapting to the digital landscape to meet students' new expectations and needs. The rapid integration of digital technologies and tools underscores the importance of promoting student engagement and interaction, which can sometimes diminish in online settings compared to in-person situations, among other factors. The transition from traditional in-person instruction to online delivery has not always made aligning courses with their new digital nature straightforward. In implementing DEI within digital transformation, establishing rapport, building communication channels, and effectively using information are crucial to fostering student interest and active participation (Alenezi, 2021).

With the growing dependence on digital technologies increasing cyber security risks, AHEIs require robust mitigation capabilities to counter cyber security risks, including conducting information security awareness campaigns

(Zezeza & Okanda, 2021). To effectively address cybersecurity concerns, AHEIs must ensure the implementation of top-level cybersecurity practices. They should deploy the appropriate tools and systems to monitor user activities, respond promptly to emerging threats, and proactively prevent security incidents rather than simply mitigating their consequences actively and closely.

Another common and practical approach to tackle the cybersecurity challenge is to nominate a chief information security officer. This individual is responsible for enforcing security measures, assessing risks, safeguarding data, staying abreast of compliance changes, responding to potential security incidents, and conducting routine cybersecurity audits within institutions. Protecting personal data, especially related to students, should be a priority for AHEIs, which is accomplished by providing safe storage options and developing policies and practices that are transparent and ethical.

Establishing infrastructure and fostering various engagement strategies that address the use of online networks to cater to a diverse audience can help mitigate the digital divide. A crucial aspect of successfully implementing DEI when adopting digital transformation in AHEIs is the ongoing focus on accessibility to the internet based on location, educational level, gender, and socioeconomic status. As internet use continues to expand, the need for robust digital infrastructure and efforts to bridge the digital divide regarding access to information outside educational institutions remains evident. Assumptions about internet access and device capabilities can hinder engagement with online

activities, making it essential to offer a range of modes that accommodate differences in bandwidth. Employing various online platforms and tools can also help offset biases associated with any single method (Bossu et al., 2023). To combat the digital divide, AHEIs must collaborate and receive support from international, regional, and private-public partnerships. Addressing the challenge of inadequate digital infrastructure and facilities can also be tackled by leveraging international, regional, and private-public collaborations to facilitate the implementation of DEI during the digital transformation drive in AHEIs.

To successfully incorporate DEI when adopting digital transformation, AHEIs must ensure they have the essential resources for its implementation, as Rodrigues (2017) highlighted. The foundation of this technology involves substantial initial investments in digital infrastructure, a financial burden shared by public and private AHEIs. These institutions should explore opportunities for cost savings and economies of scale by adopting a more collaborative approach to support research innovation, including establishing hubs at the national and subregional levels to address financial challenges effectively.

Regional partnerships and public-private collaborations offer the opportunity to create more cost-effective institutions for specialised training and applied strategic research, building on the strength of national institutions. Additionally, these partnerships can help tailor digital technologies to the specific needs of AHEIs. It is crucial to have a regulatory framework that safeguards intellectual property rights and fosters collaboration between

regional and public-private entities to support these advancements. Lusigi (2019) highlights the key to ensuring sustained investments, reproducibility, and the long-term impact of research and development expenditures on national development.

The root causes of the current under-investment in digital infrastructure and systems can be traced to a lack of institutional incentives for such investments and a failure to exploit opportunities for public-private partnerships to provide information and communication technology (ICT) services, as Alenezi (2021) noted. There is a need to intensify calls for increased investments in technology that allow AHEIs to remain competitive and overcome the narrow focus on return on investment. AHEIs should make long-lasting and strategic investments in digital infrastructure and platforms, reevaluate traditional capital expenditures, and shift a larger share of funding from physical facilities to technology and digital infrastructure. Their budgets should support a more resilient online learning environment and facilitate resource adaptability in response to unforeseen emergencies. A critical element of this effort involves establishing robust and secure digital business continuity plans, strategies, and capabilities, as highlighted by Zeleza and Okanda (2021).

To ensure a high-quality, inclusive, and diverse education and improve living conditions for generations, AHEIs should align their efforts to promote DEI with developing digital infrastructure in conjunction with educational policy. Educational policy should aim to guarantee digital access and inclusion for all

segments of the population, regardless of factors such as race, gender, socioeconomic status, or geographical location. DEI ensures that digital transformation-related initiatives are welcoming and accessible to all students and faculty, regardless of their diverse backgrounds, abilities, or circumstances.

Moreover, developing policies that support DEI in digital transformation and enable flexible infrastructure and innovative learning environments is essential to addressing the challenges posed by generational shifts and the resulting age gap. As Alenezi (2021) notes, faculty training will be needed to meet these evolving demands. The success of a digital strategy relies heavily on the ability of various stakeholders to adopt emerging technologies and use them effectively (Rodrigues, 2017), especially in the context of integrating DEI.

By offering training and educational opportunities to underrepresented groups, such as women and minority communities, organisations can contribute to a more diverse and skilled digital workforce, which is essential for the success of digital initiatives. The support for training should originate from top leadership, starting with chancellors and extending through vice-chancellors to the senate, permeating the entire AHEI. These training programmes should encourage effective collaboration between diverse groups, mitigate bias and division, and uphold the core principles of empathy and respect. Incorporating this training into student orientation and employee onboarding improves interpersonal relationships and teamwork. All training objectives must include

precise descriptions of assessment methods, tasks, course content, expert guidance, and immersive activities.

These strategies are essential to successfully implement efficient training, underscoring the need for DEI training to be an ongoing endeavour with a well-planned calendar of events. Ensuring clarity in training goals with an evaluation component is critical to the training process, facilitating continuous improvement on various fronts. DEI training should be recognised equally during the annual strategic planning to foster a commitment to AHEI initiatives.

Transforming the organisational culture through DEI training requires unwavering dedication, perseverance, and patience. Initiatives should encompass various aspects such as curriculum design, student and employee resource group formation, development plans, mentoring programmes, marketing efforts, events, strategic communication, and improvements in recruitment and retention processes. Collectively, these measures cultivate trust and a sense of belonging among all stakeholders within the AHEI (El-Amin, 2022).

The transition from piecemeal to holistic reform is instrumental in addressing the challenge of disability segregation. At one end of the spectrum, fragmentary changes, such as minor adjustments to existing policies, such as admissions, maintain the prevailing one-size-fits-all schooling model, which hampers the effective implementation of DEI during the push for digital transformation. A holistic approach involves adopting an ecological system perspective, encompassing various aspects of young people's experiences and

relationships in their homes, communities, and AHEI. It requires addressing beliefs, behaviours, abilities, and resources at these levels, as well as regional and national policies and practices.

A holistic approach to DEI should be integrated when driving digital transformation, including community involvement, given the strong connections that AHEIs often have with their local communities. DEI initiatives can extend beyond campus, fostering partnerships and outreach programmes that benefit marginalised communities and promote access to higher education. The holistic process is intricate and interactive, beginning with a comprehensive policy and framework for people with disabilities and culminating in achieving broader social sustainability objectives.

The initial step involves establishing a clear institutional policy and framework for people with disabilities, which allows them to participate in the main AHEI (Sarton et al., 2022). In addition, effective policies and interventions need to be developed to address both the digital divide and issues related to mental health disorders and learning challenges for people with disabilities. Allocating resources and making new investments is essential to provide opportunities for those impacted by digital poverty (Zezeza & Okanda, 2021).

Governments should demonstrate a genuine commitment to implementing a long-term national vision for digital transformation, integrated within the national development strategy, incorporating technology to enhance DEI. This vision should prioritise the effective use of technology to improve equity,

access, and quality in education. Aligning national policies and institutions with this vision is crucial to creating a cohesive agenda that supports DEI throughout the digital transformation process.

Addressing electricity shortages requires a multifaceted approach. AHEIs can invest in backup power systems, such as diesel generators, to maintain a stable power supply during outages and ensure that educational activities continue uninterrupted. Implementing energy-efficient technologies and practices is also essential to reduce overall energy consumption. Collaborating with governments and utility companies is another way to tackle electricity supply challenges, such as securing dedicated power lines or negotiating for more reliable access.

In response to unreliable electricity, AHEIs can shift to digital tools for e-learning, enabling students to access educational materials online and reducing the need for physical campus presence during power interruptions. However, digital learning also amplifies DEI concerns. To address these DEI challenges, AHEIs should provide targeted support to students and faculty affected by power shortages. This support could include flexible schedules, access to alternative study spaces with backup power, and financial assistance to ensure continuity in the quality of education (Tsegay, 2016).

There is considerable variation in DEI efforts across Africa due to the vast size of the continent and the unique cultural, economic, and political contexts of individual countries and universities. Therefore, DEI efforts should be tailored

when adopting digital initiatives to align with each African nation and its universities' distinct cultural, social, and economic conditions. It is important to note that DEI has ethical imperatives and strategic advantages, especially in Africa's digital transformation context.

By implementing these principles, embracing diversity, promoting equity, and nurturing inclusion, digital technologies can provide accessible, high-quality education that contributes to societal development and benefits all students and staff within AHEIs. Furthermore, this approach optimises the positive impact of digital technologies, ensuring that the benefits are equitably shared throughout the continent and improving learning outcomes, accessibility, and the development and competitiveness of AHEIs globally.

Digital transformation in AHEIs is a complex and multifaceted process that requires deliberate investment, meticulous planning, and collaboration. Encouraging collaboration between universities, government entities, and civil society organisations is crucial because they all play an important role in advancing DEI while pursuing digital transformation. To succeed, AHEIs must adopt a holistic and deliberate approach to digital transformation by incorporating the principles of DEI in every facet of their operations, internal processes, and core mission. Using a framework that facilitates the intentional management of all digital initiatives and approaches in a holistic and integrated manner is necessary. The framework should include three main components:

- Core processes including administration, education, and research;

- Emerging technologies; and
- Stakeholders involved

Ultimately, the objective is to establish a more equitable and inclusive educational environment that benefits the university community and society. Recognising that DEIs are integral and inseparable components of successfully driving digital transformation within AHEIs is crucial.

Conclusion

This research highlights that the challenges and opportunities of integrating DEI in digital transformation within AHEIs can be grouped into three categories: digital infrastructure, DEI, and policy and framework. Digital infrastructure challenges include the digital divide, human resistance to change, the implementation of digital initiatives, the satisfaction of students' expectations and needs, cybersecurity, and the lack of strategic vision. Other challenges are a lack of institutional support structures, financial constraints for funding digital initiatives and customisation of these digital initiatives, and a narrow perspective assessing the return on investment of digital initiatives integrating DEI when implementing digital transformation in AHEIs.

Digital transformation in AHEIs is a complex and multifaceted process that requires deliberate investment, meticulous planning, and collaboration. Encouraging collaboration between universities, government entities, and civil society organisations is crucial because they all play an important role in

advancing DEI while pursuing digital transformation. The challenges of DEI include understanding the concept of DEI, digital leadership, gender-based inequality, disability segregation, and centralisation. To succeed, AHEIs must adopt a holistic and deliberate approach to digital transformation by incorporating the principles of DEI in every facet of their operations, internal processes, and core mission.

The challenges of policy and framework include a lack of well-defined policy and framework integrating DEI when implementing digital transformation, an electricity crisis, and a lack of commitment by the government to prioritise DEI within the digital transformation framework. Using a framework that facilitates the intentional management of all digital initiatives and approaches in a holistic and integrated manner is necessary.

This framework should include three main components: core processes, including administration, education, and research; emerging technologies; and stakeholders involved. Ultimately, the objective is to establish a more equitable and inclusive educational environment that benefits the university community and society. Recognising that DEIs are integral and inseparable components of successfully driving digital transformation within AHEIs is crucial.

Overcoming the challenges is facilitated by adopting a perspective that considers integrating digital transformation and DEI, thereby promoting progress toward inclusive organisational practices that nurture equity across multiple intersecting identities while implementing digital transformation initiatives. This

research further recommends that future research be carried out to investigate disability and digital transformation in AHEIs. More research is needed to address the digital divide in AHEIs.

Declarations

Competing Interests

The authors declare that they have no competing interests.

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