Luis Fernando González-Beltrán
(Organizador)

Educação no Século XXI:

Perspectivas Contemporâneas sobre Ensino-Aprendizagem

VOL IV

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2025

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PRÓLOGO

La educación contemporánea, dentro de un contexto de cambios sociales y culturales, vertiginosos y contundentes, se caracteriza por una profunda transformación epistemológica, tecnológica y social. En las primeras décadas del siglo XXI, las instituciones educativas de distintos países han sido convocadas a repensar sus fundamentos, métodos y finalidades en un escenario marcado por la aceleración digital, la creciente diversidad de los contextos de aprendizaje y la necesidad urgente de promover competencias cognitivas, sociales y humanas que respondan a un mundo en constante cambio.

Esta obra, **Educação no século XXI: Perspectivas Contemporâneas sobre Ensino-Aprendizagem IV,** que reúne autores de múltiples países de América Latina, África y Europa, refleja precisamente esa pluralidad de miradas, experiencias y realidades. Las contribuciones aquí presentadas evidencian no solo la vitalidad de la investigación en educación, sino también la convergencia de esfuerzos internacionales en torno a la construcción de prácticas pedagógicas más inclusivas, innovadoras, contextualizadas y humanizadas.

La organización del libro en cuatro ejes temáticos ofrece una lectura articulada y coherente de los distintos enfoques.

El primer eje, dedicado a *la Enseñanza de la Matemática, el Pensamiento Crítico y la Inclusión Educativa*, aborda los desafíos formativos en el ámbito de la didáctica de la matemática en contextos diversos, y de la preparación docente. Inicia con el desarrollo, desde la primaria, del pensamiento crítico, tan relevante para la formación ciudadana. Continúa con la educación superior, se discuten experiencias en el contexto pospandémico, al combinar el enfoque tradicional con la metodología de Aprendizaje Basado en Equipo, que apuntan a reconstruir aprendizajes y fortalecer metodologías orientadas a una participación más activa y con equidad. Sigue con los retos de la formación inicial docente y la incorporación de enfoques inclusivos en la enseñanza, primero con respecto a la estadística, luego en términos generales de la matemática, y finalmente en la educación normalista.

El segundo eje, *Metodologías Activas, Tecnologías Educativas e Innovación Didáctica*, presenta reflexiones y experiencias que evidencian el impacto creciente de las tecnologías emergentes y de los modelos pedagógicos activos en los procesos de enseñanza-aprendizaje. Aquí se analizan el uso pedagógico de la realidad virtual y aumentada, que propicia un aprendizaje interactivo, con experiencias inmersivas para las prácticas que deben desarrollar los estudiantes. Asimismo, se revisa la aplicación

de sistemas de inteligencia artificial para apoyar a docentes y estudiantes, donde se busca un uso ético que permita la autonomía y el pensamiento crítico. Se incorpora también la implementación del modelo *Flipped Teaching* en la formación en ingeniería, como estrategia didáctica innovadora para fortalecer competencias técnicas, bilingües y digitales. Además, se muestra la incorporación de dispositivos electrónicos de bajo costo en la experimentación científica y proyectos de investigación escolar sobre fenómenos naturales, que buscan vincular el aula con problemáticas locales y ambientales. Estas contribuciones muestran cómo la innovación tecnológica y metodológica puede ampliar horizontes didácticos, democratizar el acceso al conocimiento científico y promover aprendizajes activos y contextualizados.

El tercer eje, **Políticas Educativas, Gestión Universitaria y Reformas de la Educación Superior,** reúne estudios que examinan dimensiones institucionales, sociales y sistémicas de la educación. En este apartado se incorporan reflexiones sobre el currículo democrático y la educación para la protección civil, así como sobre los procesos socioeducativos vinculados a la sustentabilidad en contextos interculturales, que refuerzan el papel de la universidad en la transformación social y ambiental. Asimismo, se analiza la acción tutorial universitaria como un factor clave para la permanencia estudiantil, a pesar de sus limitaciones estructurales. Se abordan también la importancia de estructuras curriculares coherentes, con planes de supervisión adecuados, así como modelos integrados de gestión e innovación académico-administrativa que presentan posibilidades de transferencia a otros contextos universitarios. Finalmente, se examinan los desafíos que enfrentan los sistemas de educación superior en contextos marcados por tensiones sociopolíticas y económicas, ampliando el debate sobre la relación entre políticas públicas, gobernanza educativa y calidad de la formación.

Finalmente, el cuarto eje, **Formación Integral, Humanidades y Desarrollo Socioemocional**, se inicia con una reflexión contemporánea sobre las representaciones sociales de la automatización y la inteligencia artificial generativa en la formación universitaria, problematizando los vínculos entre saberes, ética y tecnologías emergentes.

Los capítulos abordan la creación de ambientes formativos seguros y libres de violencia, la vigencia del pensamiento pedagógico ilustrado en la defensa de una educación centrada en el sujeto, y la relevancia de las habilidades socioemocionales y de las denominadas *soft skills* en la formación profesional contemporánea. En conjunto, estos textos reafirman la necesidad de una educación que considere al estudiante como una persona integral, capaz de actuar con autonomía, ética, sensibilidad y responsabilidad social.

Esta obra constituye, así, un mosaico amplio y multifacético de la educación en el siglo XXI. Al integrar perspectivas provenientes de diversas disciplinas, países y tradiciones académicas, el libro evidencia que los desafíos educativos actuales no pueden abordarse de manera aislada, sino que requieren diálogo, interdisciplinariedad y colaboración internacional.

Deseo que el lector tenga una lectura inspiradora y fructífera, que contribuya a ampliar debates, fortalecer prácticas e impulsar nuevas investigaciones en el vasto campo de la enseñanza-aprendizaje contemporánea.

Dr. Luis Fernando González Beltrán
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ABSTRACT: This paper delves into the practical challenges Zimbabwean universities face in implementing Education 5.0, a transformative educational framework designed to align Higher Education with the national socioeconomic development goals. Despite the ambitious vision of creating a more dynamic and innovation-driven educational landscape, several difficulties form barriers to its realisation. Some of these issues include inadequate funding, insufficient infrastructure, and the lack of adequately trained faculty to deliver the new curriculum. This paper explores how these barriers have an impact on the core pillars of Education 5.0 and highlights the gap between policy and practice. Additionally, it brings to life the sociopolitical context and considers how historical legacies and contemporary governance affect educational reform efforts. The paper also provides a comprehensive overview of the current state of Education 5.0 in Zimbabwe, it identifies critical pain points and praises the policy's noble rationale. This paper argues that while the journey towards fully realising this goal is fraught with challenges, it is a potential pathway to creating a self-sustaining and innovative Zimbabwean society.
KEYWORDS: decolonisation; education 5.0; educational reform; transformation.

1. INTRODUCTION AND BACKGROUND

Similar to most post-colonial states, higher education in newly independent Zimbabwe faced several challenges. In 1995, the first university in Zimbabwe, the University College of Rhodesia, was established as an affiliate of the University of London to serve present-day Malawi, Zambia and Zimbabwe (Gelfand, 1978). The rationale was to ensure the adherence to colonial standards of academic reputation and social influence by keeping the university college under the supervision of an academic body in the United Kingdom. Under the same colonial state, the institution was later renamed the University of Rhodesia and the University of Zimbabwe-Rhodesia, and at independence, it was renamed the University of Zimbabwe (Garwe & Thondhlana, 2019). According to Kirkwood (1979), with access

heavily restricted in the country for the black majority during the colonial period, the qualifications and curricula were modelled along the British model of education through the 'strategic partnership' with the parent institutions in the United Kingdom (University of London for all other programmes and University of Birmingham for Medicine).

Regrettably, only a small number of indigenous people in Zimbabwe have access to a complete cycle of primary, secondary and tertiary education. To broaden access to education, the newly independent state set out to undo the inequalities under the auspices of the 'Education for all' principle adopted at independence (Kanyongo, 2005). This principle saw a massive drive to increase access to primary and secondary education; yet, there remained only one university servicing the whole country between 1980 and 1990, a rate incomparable to the rest of the education system (Garwe & Thondhlana, 2019). Six additional universities were established in the next decade (1990 to 2000), four of which were private institutions run by churches. This changed dramatically, and as of 2024, there were 14 state and seven private universities, totalling 21 registered universities.

2. DECOLONISED EDUCATION AND DEVELOPMENT IN AFRICA

Despite facing severe challenges, such as inadequate infrastructure and political instability, education in Africa holds the potential to create a self-sustaining and innovative society capable of driving sustainable development (Mutongoza, 2024; Olawale et al., 2022). Education for Sustainable Development (ESD) principles are vital for enhancing countries' overall development and progress because they focus on contextual relevance and ensure that education resonates with lived experiences (Nyambiya et al., 2024; Tikly, 2019). Mutongoza et al. (2023b) argue that dismantling colonial influences and integrating African perspectives and knowledge systems into education systems is essential for genuine development in Africa. Such an approach reclaims African identity and fosters sustainable and inclusive development.

At its core, decolonised education gives a prominent voice to African history, languages, and cultural practices, which have been long marginalised in traditional colonial education systems that venerate Western ways of knowing (Ndlovu-Gatsheni, 2018). As with the norms and traditions elsewhere, it is common cause that teaching African students about their rich heritage (this involves honesty about the traumas and the gory colonial past) and their often-ignored contributions to world civilisation fosters a sense of pride and identity. Including African literature, philosophy, and history in curricula allows students to connect with their roots and appreciate their cultural heritage. It must be emphasised that while significant strides have been made towards decolonising

curricula in Africa, the wheels of decolonisation are still turning very slowly (Mutongoza et al., 2023b). Intentionally including African perspectives and knowledge systems into education, African societies can build a more inclusive, resilient, and prosperous future that honours their own heritage and leverages their unique strengths.

For a long time, African students and faculty have been 'bogged down' with teaching and learning material irrelevant to their context. The vestiges of colonialism remain prominent in how many African countries *do* formal education – the curricula, languages of education, the resources used in learning, and the theories informing educational practices, among others, are still heavily Westernised (Heleta & Mzileni, 2024). Conversely, decolonised education ensures that learning is relevant to the local contexts and addresses African societies' specific needs and challenges. Traditional colonial education systems often prioritise Western knowledge and skills that may not apply directly to African contexts. As Anugwom (2021) argues, decolonised education prepares African students to address real-life community problems by integrating indigenous knowledge systems, agricultural practices, and local languages.

Owing to the bastardisation of their heritages and knowledges for the benefit of Western ones, African education systems are often compelled to accept the dominance of Western pedagogies far removed from their immediate environments. As Mavengano et al. (2022) reveal, for a long time after political independence in African states, education has remained shackled to the ways of erstwhile colonial masters. However, the prospect of decolonised education challenges these dominant narratives imposed by colonial education systems through encouraging critical thinking and innovation that is grounded in their own cultures and ways of life (Mapara, 2023). Proponents of decolonisation believe that decolonised education empowers students to question and analyse problems or challenges from multiple perspectives in a way that engenders creativity and problem-solving skills (Brink, 2023). Placing prominence on critical thinking, ethics, and leadership rooted in African values at African universities can produce graduates who are well-equipped to drive social change and innovation in their communities.

A significant result of education founded in coloniality was the massive exclusion of some populations for the benefit of others. Education in most African societies, without the antidote of decolonisation, remained marred by exclusivity – this oftentimes manifests in the languages used in learning, the organisation of the curriculum, the structuring of the schooling system, and the values upheld by these systems (Mutongoza et al., 2023b). It remains unsettling that excellence remains rooted in how close an institution or individual resembles the former colonial masters' standards. Consider, for example, the elevation of accents and mannerisms, among other aspects. In contrast, Qhosola and Mahlomaholo

(2019) contend that decolonised education offers an alternative and inclusive pathway that addresses the diverse needs of all segments of society, including marginalised indigenous communities. In incorporating the knowledge and experiences of these groups, decolonised education promotes social equality and inclusive development because it ensures that education is accessible to a broader population, fostering national unity and reducing social inequalities (Anugwom, 2021). Such an inclusive approach helps break down barriers and creates opportunities for all citizens, contributing to more equitable development and increasing self-reliance.

3. THE RATIONALE BEHIND EDUCATION 5.0 IN ZIMBABWE

Zimbabwe implemented Education 5.0 to transform its Higher Education system, addressing the nation's socioeconomic challenges and aligning with its developmental aspirations. This new educational framework shifts from the traditional, theory-focused Education 3.0 model to a more practical, hands-on approach that emphasises five critical pillars: teaching, research, community service, innovation, and industrialisation (Togo & Gandidzanwa, 2021). The rationale was to create a more dynamic and responsive education system that imparts knowledge and fosters practical skills and innovation.

One of the primary objectives of Education 5.0 is to align the education system with Zimbabwe's national development goals, notably Vision 2030, which aims for the country to achieve an upper-middle-income status by 2030 (Mabwe & Mabhanda, 2023). According to Gwiza et al. (2023), this alignment ensures that educational institutions contribute directly to national development, producing graduates who can drive economic growth and development. Education 5.0 thus seeks to equip students with the skills necessary to develop local industries and promote economic self-sufficiency through emphasising innovation and industrialisation (Mabika & Maireva, 2022).

Moreover, Education 5.0 addresses the critical issue of unemployment by shifting the focus from producing job seekers to nurturing job creators. The initiative aims to empower graduates to create opportunities and contribute to job creation by integrating entrepreneurial and innovative skills into the curriculum (Siyakwazi & Machingura, 2021). This is complemented by a strong emphasis on community engagement, encouraging educational institutions to play a proactive role in community development and addressing local problems through applied research and service (Mutongoza, 2024).

Most importantly, Education 5.0 seeks to enhance the global competitiveness of Zimbabwe's education system. The policy aims to produce well-prepared graduates to compete in the global job market by adopting contemporary educational practices and

leveraging new technologies (Alharbi, 2023). This comprehensive approach to education reform is designed to create a more relevant and effective education system that meets the needs of society and the economy (Muzira & Bondai, 2020). The following section deals with the five pillars of Education 5.0.

4. PILLARS OF EDUCATION 5.0: ZIMBABWE IN THE GLOBAL CONTEXT

Teaching is the most basic of Higher Education institutions' mandate and focuses on delivering practical and skills-based education. Under Education 5.0, teaching aims to move from teaching purely theoretical knowledge to more hands-on learning experiences. This involves potentially updating curricula to include contemporary problems and technologies that enhance the quality of instruction and ensure that students gain competencies that are directly applicable to the job market. Education 5.0 seeks to produce graduates who will be better prepared to meet the demands of modern industries and society by emphasising experiential learning. This calls us to consider Matswetu (2011) and Rudhumbu et al. (2021), who remind us that quality teaching is predicated on the quality and quantity of the academic staff complement an institution employs.

The second pillar is geared towards practical problem-solving and innovation. Research under Education 5.0 encourages students and faculty to engage in research activities that address real-world challenges and contribute to national development goals. The focus is on applied research that has practical applications, driving advancements in various fields, such as agriculture, health, technology, and the environment. Education 5.0 aims to generate new knowledge and solutions to propel the country forward by fostering a research culture that prioritises innovation and relevance. The work of Mushuku and Chigora (2014) and Pasipamire and Hoskins (2019) reveals that while universities are expected to extend knowledge and development through research, academics in Zimbabwe decry systemic challenges, such as the funding constraints and institutional gatekeeping, among other things.

The third pillar aims to engrave the Higher Education system's duty in the development imperative in Zimbabwe. Community service is viewed as an integral component of Education 5.0 because it emphasises the role of universities in serving and uplifting their communities (Mutongoza et al., 2023). The rationale, as Mutongoza (2024) contends, is that because communities give universities operating space, universities are bound by implicit rules of active citizenship to actively contribute as responsible citizens to develop the communities in which they find themselves operating. Thus, this pillar promotes the engagement of students and faculty in community development projects,

ensuring that the benefits of education extend beyond the classroom. Through tackling local challenges and contributing to societal well-being, educational institutions can build stronger connections with the communities they serve. Such a reciprocal relationship enhances the practical relevance of education and fosters a sense of social responsibility among students.

The innovation pillar is central to Education 5.0, aiming to create a culture of creativity and entrepreneurship within educational institutions. This involves the establishment of innovation hubs, incubators, and technology parks, where students can develop and test new ideas. In this vein, the study by Asheim et al. (2019) reminds us that development depends on a country's innovative capacity and triune interlinks between universities, industry, and government. Through this, universities assume a role that is more than merely the provision of human capital and research and development. Through providing resources and support for innovation, the education system can nurture the entrepreneurial spirit and enable students to transform their ideas into viable businesses or solutions. One may also consider Thomas et al. (2021), who argue that universities in emerging economies must create an ecosystem conducive to entrepreneurship and innovation. Thus, this focus on innovation holds the potential to drive economic growth and diversification in a way that positions Zimbabwe as a hub for technological and industrial development.

Industrialisation is presented as the pinnacle goal of Education 5.0 because it links education directly with economic development. This pillar seeks to bridge the gap between academia and industry, ensuring educational outcomes that align with the economy's needs. This is corroborated by Majoni and Chikosha (2022), who argue that universities in developing countries must actively contribute to industrial capabilities. Education 5.0 thus promotes the development of a skilled workforce that can drive industrial growth through fostering partnerships between universities and industries. Moyo (2018) argues that a more transformative approach to human capacity development must be a top priority to achieve industrialisation. This may mean the need for more practical training, internships, and collaborative projects between universities and industry partners to help students gain real-world experience and enhance their employability. Through industrialisation, the education system is expected to create jobs, boost productivity, and achieve sustainable economic development.

5. EDUCATION 5.0 IN ZIMBABWE: CURRENT REALITIES

Despite the significant prospects for success presented by Education 5.0 in Zimbabwe, it is prudent to intentionally explore its fissures and expose them to enable

solution generation. The following sections will interrogate the challenges that militate against attaining the ideal of each pillar of Education 5.0 in Zimbabwe.

5.1. TEACHING CHALLENGES AT ZIMBABWEAN UNIVERSITIES

Funding and resource constraints

Zimbabwe's universities face significant challenges related to funding and resource constraints. The economic instability in the country has led to reduced government funding for Higher Education institutions. According to Chinyoka and Mutambara (2020), the situation in most state-run universities is increasingly becoming unbearable because of influences such as rising inflation and political challenges. Zvitambo et al. (2022) note that in the post-Covid-19 pandemic era, Zimbabwe has faced dwindling government funding for Higher Education. It is thus unsurprising that Zimbabwean universities struggle with inadequate facilities, outdated equipment, and limited access to research materials. This shortage of resources hampers both teaching and learning, making it difficult for educators to provide a high-quality education. Additionally, the lack of funding affects the maintenance and expansion of infrastructure, which is essential for accommodating the growing student population.

Brain drains and faculty shortages

Another major challenge is the brain drain phenomenon, where highly qualified academics leave the country for better opportunities abroad. This exodus has resulted in a shortage of experienced and skilled faculty members, which affects the quality of education. Given the economic crises that have ravaged Zimbabwe, Zeleza (2022) argues that quality is often undermined when the quality and quantity of faculty do not complement enrolment. The remaining educators are often overburdened with heavy teaching loads and administrative duties, leaving them with little time for research and professional development. As with other sub-Saharan African countries, the increase in student enrolment and programme offerings in Zimbabwe has not received complimentary faculty increases. In fact, deteriorating remuneration and working conditions have made academic careers less attractive, and rising student-faculty ratios in universities have grimly challenged educational quality (Mukwambo, 2020). This situation compromises quality in the academic environment, as students do not always receive the guidance and mentorship they need to excel in their studies.

Curriculum relevance and innovation

Despite the promises of Education 5.0, ensuring that the curriculum remains relevant to the current job market and global trends is a persistent challenge for

Zimbabwean universities. Studies such as Bhebhe et al. (2015) and, more recently, Chasokela and Moyo (2024) reveal that low industry utilisation and theory-intensive curricula are prominent drivers of low attrition of graduates into the mainstream economy. In reality, many institutions in Zimbabwe still struggle to update their programmes to meet the industry's evolving demands. A review by Sibanda and Young (2020) reveals that despite successive curriculum reforms since independence, the universities have failed to deliver a genuinely transformed curriculum. This gap between academic offerings and market needs results in graduates who do not possess the necessary skills and knowledge to thrive in their careers. As Chuma (2022) reveals, owing to the technological lag affecting Zimbabwean universities, there is often a lack of emphasis on innovative teaching methods and technology integration, which are crucial for preparing students for the technologically advanced workforce.

Sociopolitical pressures

Universities in Zimbabwe also face political and social pressures that affect their functioning. Political interference can affect the autonomy of institutions, influencing administrative decisions and reducing academic freedom. Mushawatu (2020) reports that owing to this lack of autonomy, it is not uncommon for students and faculty to self-censor themselves, having witnessed victimisation of dissenting voices by government agencies. While students and staff in Science faculties report significant academic freedoms, their counterparts in the Social Sciences and Humanities faculties report that these are stifled significantly because these faculties are usually instrumental in critiquing government performance. An additional complexity is that the President of Zimbabwe is the Chancellor of all state universities, and he appoints the Vice Chancellors of all these universities, who, in turn, appoint the crucial players in the administration and running of these universities (Murove & Chitando, 2018). To be critical in teaching and learning is thus significantly challenging for students and faculty as this would be akin to biting the hand that feeds you. According to Shonhiwa (2024), sociopolitical issues, such as economic hardships among students and faculty, and changes in government policies, can impede these institutions' academic and operational progress. These pressures create an unstable and constrained educational environment that hinders universities' ability to provide consistent and effective teaching.

Student welfare and support services

The welfare of students is another area of concern, with many universities struggling to provide adequate support services. According to Manwa et al. (2019), problems such as insufficient accommodation, limited access to healthcare, and lack of

mental health resources affect students' overall well-being. Mukwambo (2019) argues that well-being must not be isolated from Higher Education's teaching and learning imperative because well-being directly affects students' access and success at these institutions. Thus, students may struggle to balance their academic responsibilities with their personal challenges without being afforded proper support. This is supported by Mapuranga et al. (2015), who argue that students often decry poor service provision, which would have been helpful in the face of the challenging economic outlook, as a reason for the failure to complete their studies on time. The lack of support services continues to cause high dropout rates and low academic performance, further exacerbating the challenges faced by Zimbabwe's Higher Education system.

5.2. RESEARCH CHALLENGES IN ZIMBABWEAN UNIVERSITIES

Research funding and resource constraints

One of the most significant research challenges at Zimbabwe's universities is the severe constraint of research funding and resources. While Rambe (2023) acknowledges that the growing calls for improved output and productivity have resulted in the development of a knowledge-based economy, Mutongoza (2024) reminds us that research funding shortages at Zimbabwean universities stifle research activities and the ability to conduct novel research. The unwanted consequence is usually the regurgitation of old knowledge and research with limited impact on sustainable development outcomes. Studies such as Garwe (2015) attest that it is not uncommon for universities to struggle to acquire essential research material, modern laboratory equipment, and access to up-to-date academic journals and databases because of decreased investment in research activities. Tapfuma and Hoskins (2021) argue that given the high per-capita university ratio (number of universities divided by the population) in southern Africa, the research outputs of Zimbabwean universities are concerning. The scarcity of resources stifles the ability of researchers to conduct cutting-edge studies and in turn, this contributes to the stagnation of innovation and scientific advancement within the country.

Brain drain

Also because of the ongoing brain drain, Zimbabwe's universities face a critical challenge in retaining talented academics and researchers. Many skilled academics and researchers leave the country for better opportunities, higher salaries, and more conducive research environments abroad. To put this into perspective, Robinson (2020) reveals that the most prominent reason for the departure of academics from Zimbabwe is economic – especially the hyperinflationary environment, cash shortages, low salaries,

and scarcity of essential goods and services. Kanonge and Bussin (2022) reveal that the situation is desperate because this challenge is also negatively affecting the quality of graduates being churned out. As people have lost their life savings at the hands of questionable policy environments, trust in the ability of the sitting government remains a topical theme for the academics and the rest of the skilled workforce's reasons for not returning to Zimbabwe (Chigora, 2018; Majoni, 2014). Evidently, as Mushuku and Chigora (2024) reveal, the mass exodus of academics left universities with weakened pools of experienced researchers and this created gaps in expertise and mentorship for emerging scholars. The loss of intellectual capital has severely affected the quality and continuity of research projects and undermined the growth of research programmes.

Institutional support and infrastructure

The lack of adequate institutional support and infrastructure poses a significant barrier to research activities. While Roztocki et al. (2020) reveal that research and innovation are central to socioeconomic development, the infrastructure enabling this in the developing world remains scanty. According to Mashaah et al. (2014), most Zimbabwean universities have limited research governance and management capacity, despite projects initiated to partner with their counterparts in the developed world. The work by Garwe et al. (2021) demonstrates that many universities in Zimbabwe do not have dedicated research offices or administrative frameworks to support grant applications, project management, and dissemination of findings. A damning verdict is offered by Machimbidza et al. (2022), whose study of the Zimbabwean School of Mines found that the institution did not meet feasibility tests for research data management as it lacked a robust system to support data creation, collection and storage. As with other developing African countries, the infrastructure for conducting research, such as specialised laboratories, research centres, and fieldwork facilities, is often inadequate or outdated (Chigwada et al., 2017; Mushuku & Chigora, 2014). Consequently, this lack of support systems and infrastructure hampers researchers' ability to pursue ambitious projects and secure external funding.

Collaborative opportunities and networking

Another significant challenge confronting research in Zimbabwe concerns the limited opportunities for collaboration and networking with international research communities. Tarusikirwa and Mafa (2017) argue that collaborative research holds vast benefits, such as access to expertise, funding and resources, an exchange of ideas, and improved potential to solve complex problems. Chinyoka and Mutambara (2020) reveal that because of the economic and geopolitical factors, researchers at state universities

in Zimbabwe report difficulties in establishing and maintaining global collaborations. This isolation restricts their access to diverse perspectives, expertise, and funding opportunities that are essential for conducting high-impact research (Ngwenya & Boshoff, 2023). This challenging situation is further compounded by poorly developed digital infrastructure that does not permit communication between potential research partners through video conferencing platforms (Tarusikirwa & Mafa, 2017). Dlodlo et al. (2023) argue that there remains a genuine need for systems that support young researchers with networking and collaborative efforts to boost research capacity. As such, the lack of participation in international conferences and academic exchanges reduces the visibility of Zimbabwean research on the global stage.

Ethical and regulatory hurdles

Navigating ethical and regulatory requirements can also be challenging for researchers in Zimbabwe. Rusero (2022) cautions that *authoritarian regimes* are highly skilled in devising excessive mechanisms that limit researchers' access to information and data retrieval. Evidently, the situation has not changed since Mandiyanike (2009) revealed that research was hampered by fear, antipathy, and limited access to information, among other factors. It is not uncommon for qualitative researchers in Zimbabwe to lament overly excessive gatekeeping in obtaining research permits, ethical approvals, and compliance with local regulations (Mukeredzi, 2011). Accordingly, Siwale (2015) contends that these bureaucratic hurdles can delay the initiation and progress of research projects, leading to frustration and inefficiencies. In addition, Pritchard (2018) argues that the lack of clear guidelines and political interference in research practices often result in challenges when aiming to obtain access and maintaining research integrity and accountability.

5.3. COMMUNITY SERVICE CHALLENGES IN ZIMBABWEAN UNIVERSITIES

Resource constraints and funding issues

Due to resource constraints and funding issues, Zimbabwean universities face significant challenges in providing effective community service. As Chinyoka and Mutambara (2020) argue, the prevailing economic instability and limited government support have led to financial shortfalls that restrict the universities' ability to initiate and sustain community service projects. Mutongoza (2024) contends that without adequate funding, universities will continue to struggle to invest in the necessary resources, transportation, and human resources required for outreach activities. This is supported by Mpofu et al. (2024), who reveal that implementing sustainable development projects is costly, and universities in developing countries such as Zimbabwe operate under

significantly limited funding because efforts at community engagement are often hamstrung. As such, financial constraints continue to hinder the scope and impact of community service initiatives, limiting their ability to comprehensively address the needs of local communities (Museva, 2018).

Administrative and structural limitations

The administrative and structural limitations within Zimbabwean universities further complicate their community service efforts. Using the case of Midlands State University, Museva and Preece (2021) report that the leadership styles employed by the university in community engagement often ignore dialogue, power dynamics and community assets. Although they are expected to lead in community service, many institutions still lack dedicated offices and well-trained personnel focused on community engagement and outreach. Museva (2018) argues that the absence of structured frameworks makes it difficult to effectively plan, coordinate, and implement community service projects. According to Mutongoza (2024) and Nhavira (2019), the existing administrative workload on faculty and staff means community service often takes a backseat to other academic and administrative responsibilities, reducing the time and attention devoted to meaningful community involvement.

Skills gaps and training needs

Another barrier to effective community engagement in Zimbabwe is the lack of training and development for faculty and students in community service skills. Using the case of the Great Zimbabwe University, Nyambiya et al. (2024) reveal that insufficient personnel training significantly hampers community engagement in universities' sustainable development efforts. This contrasts with the prescription by Mutongoza et al. (2023) that effective community service requires a range of competencies, including project management, cultural sensitivity, and problem-solving skills. Regrettably, universities often do not provide adequate training or professional development opportunities in these areas. Chile and Black (2015) warn that skills gaps can lead to poorly designed and executed projects that neither meet the communities' needs nor do they create sustainable impact. Thus, without proper training, both faculty and students remain ill-equipped to engage effectively with the communities they aim to serve.

5.4. INNOVATION CHALLENGES AT ZIMBABWEAN UNIVERSITIES

Inadequate support systems and infrastructure

The absence of strong support systems and infrastructure poses another challenge to innovation at Zimbabwean universities. Simuka and Chinakidzwa (2022) reveal that

despite the commitment to boosting their innovative capacity, all but six universities lack dedicated innovation hubs, incubators, and research centres that are crucial for nurturing creative ideas and translating them into practical applications. Additionally, the study by Friederici (2019) reveals that in Zimbabwe and other African countries, while innovation hubs are perceived as innovative and exciting, realities on the ground tend to challenge the attainment of visions for development. These sentiments are supported in the study by Mazorodze and Mkhize (2024), which concludes that how universities are structured in Zimbabwe is a significant impediment to the attainment of the innovation mandate. This institutional support deficiency means innovative projects frequently face bureaucratic hurdles and logistical challenges, impeding their progress and scalability.

Curriculum challenges

Outdated curricula and traditional teaching methods also pose significant barriers to innovation. Although there is a push to revise curricula and pedagogy, the reality is that Zimbabwean universities have not sufficiently modernised their academic programmes to include interdisciplinary approaches, critical thinking, and hands-on problem-solving skills (Hahlani et al., 2022). A damning verdict is offered by Manyati et al. (2024), who argue that government-owned institutions still show minimal or no adjustments in course content to incorporate essential green skills. According to Hahlani et al. (2022), part of these curriculum and pedagogical challenges are rooted in the reality that universities and lecturers are highly unprepared to implement the transformed curriculum. This gap between current educational practices and the needs of an economy desperate for rapid acceleration means that students are not adequately prepared to think creatively and develop innovative solutions to problems (Mutongoza, 2024). Therefore, there is often limited emphasis on entrepreneurship and the practical application of knowledge, which are crucial for fostering an innovative mindset among students.

Limited industry collaboration and networking

Evidence suggests that practical innovation often requires strong collaboration between academia and industry; yet, Zimbabwean universities face challenges establishing and maintaining these partnerships. Earlier studies by Moyo and Özgit (2022), Murairwa (2021), and Simuka (2023) argue that the policy imperative on collaborations between universities and industry in Africa remains unclear, while collaboration between universities and industry has been known to boost economic growth. Kumba et al. (2024) reveal that limited interaction and collaboration with the private sector in Zimbabwe means that universities miss valuable insights, resources, and real-world applications for their research. According to Dube (2023) and Simuka (2023), this lack of networking

opportunities restricts the exchange of ideas and best practices, which are vital for spurring innovation. Thus, enhancing industry collaboration and international networking is essential for creating a dynamic and supportive environment for innovation.

Regulatory and policy barriers

Regulatory and policy barriers also impede innovation efforts at Zimbabwean universities. The experiences of international researchers, such as Mandiyanike (2009), Musasa (2021), and Pritchard (2018), point to the continued complex and cumbersome processes for obtaining research permits, ethical clearances, and intellectual property protection in Zimbabwe. The work by Togo and Gandidzanwa (2021) reveals that for a country yearning to be a hub for innovation and industrialisation, Zimbabwe's regulatory and policy hurdles stagnate and slow down the potential for collaboration in innovative projects. This is further supported by Mazorodze and Mkhize (2024), who reveal that the absence of clear policies and incentives for innovation and entrepreneurship discourages faculty and students from pursuing groundbreaking research and development. However, streamlining regulatory procedures and creating supportive policies are crucial steps towards fostering a more conducive environment for innovation.

5.5. INDUSTRIALISATION CHALLENGES AT ZIMBABWEAN UNIVERSITIES

Funding inadequacies

One of the foremost challenges at Zimbabwean universities to be able to meaningfully drive Zimbabwe's goals of industrialisation is inadequate funding and financial support. While Mutandavari et al. (2023) agree that universities have a role in engendering sustainable development, this role has been hamstrung in Zimbabwe. According to Garwe and Thondhlana (2019), this can partly be attributed to economic instability and the resultant reduction of government investment in Higher Education, which impacts the ability of universities to develop and sustain industrialisation projects. Sadly, without sufficient funding, universities struggle to invest in necessary infrastructure, equipment, and technology that are crucial for fostering industrialisation (Chinyoka & Mutambara, 2020). This is supported by Kwandayi (2021), whose study recommends that universities urgently modernise their funding models to enhance their performance and contribution towards an industrialised Zimbabwe. Thus, financial limitations significantly hamper the ability to attract and retain skilled personnel required to drive industrialisation initiatives.

Outdated curriculum and skills mismatch

At many Zimbabwean universities, the curriculum has not kept pace with the demands of modern industries, leading to a significant skills mismatch. It is the contention

of Kwandayi (2021) that the quality and relevance of Higher Education are central to the success of the imperative for industrialisation. However, Moyo (2018) and Moyo and Özgit (2022) reveal that graduates often find that their education does not adequately prepare them for the technical and practical challenges of the industrial sector. Kwandayi (2021) recommends that Zimbabwean universities continually review their curricula content. When there is a disconnect between academic programmes and industry needs, the result is a workforce lacking the necessary skills and competencies to drive industrialisation. While the rationale is commendable, work-related learning in its current form is done simply as a tick-box exercise with no effect of value addition to either the students or the faculty (Jengeta et al., 2021; Matamande et al., 2013). Contrary to what the name 'work-related learning' suggests, there is often very little learning that happens because of breakdowns in communication and collaboration between the sending institutions and receiving workplaces. Thus, universities must update their curricula to effectively deliver more practical, hands-on training and industry-relevant skills, which is essential for aligning education with industry's needs.

Collaboration and partnerships

According to Rossoni et al. (2023), effective industrialisation requires strong collaboration between universities and industries. Nonetheless, Zimbabwean universities often face challenges in establishing and maintaining these partnerships. Majoni and Chikosha (2022) reveal that some challenges with university-industry partnerships include the universities' reservations about too close collaborating with industry, information deficiencies, policy gaps, and conflicts of interest. In addition, there is a lack of formalised mechanisms for university–industry collaboration, resulting in limited opportunities for joint research, internships, and knowledge transfer. One can consider Chinyamunjiko et al. (2022), who contend that despite introducing innovation hubs that were meant to facilitate collaborations and partnerships between universities and industry, not much activity was happening owing to deficiencies in structures and procedures that would enable the process. Kanhukamwe et al. (2020) encapsulate the consequences of such deficiencies by noting a worrisome deficiency in international patent filings in Zimbabwe. Thus, while enhancing industry collaboration through strategic partnerships and collaborative projects is vital for fostering an environment conducive to industrialisation, the existing gap restricts the flow of innovation from academia to industry and vice versa.

Infrastructure deficiencies

Zimbabwean universities' infrastructure and technological deficiencies pose a significant barrier to industrialisation. It is important to note that regardless of the promise

presented by Education 5.0, many institutions lack the state-of-the-art laboratories, research facilities, and advanced equipment necessary for industrial research and development. Gwiza et al. (2023) contend that there is a chronic lack of funding to support advanced research and facilities for groundbreaking industrial solutions. Studies such as Bonga and Sithole (2020) reveal that infrastructural deficiencies are not only limited to universities, but this has been a prominent problem for industries, principally because the state has been engrossed with economic struggles. While investment in modern infrastructure and technology is crucial for enabling universities to contribute effectively to the country's industrialisation efforts, Zimbabwe has been notoriously flagged as being unable to maintain the existing old infrastructure, thus making dreams of more novel technologies seem unattainable (Mukura et al., 2019). Several studies have noted inadequacies concerning some of the most basic facilities, such as classrooms and living spaces (Majoni, 2014; Chinyoka & Mutambara, 2020). Thus, the dream of adequate and high-quality infrastructure heralding the industrialisation imperative under the auspices of Education 5.0 at Zimbabwean universities must be regarded with caution, primarily owing to what evidence has led us to believe.

Talent retention

The issue of brain drain, where highly qualified academics and researchers leave Zimbabwe for better opportunities abroad, severely affects the industrialisation potential of universities. In assessing the impact of the loss of skilled labour on the development of African countries, Adesote and Osunkoya (2018) argue that no meaningful development can happen in the face of the constant loss of the best brains to migration. This position is telling in the context of Zimbabwe, where several academics and captains of industry have left the country for the proverbial greener pastures (Kanonge & Bussin, 2022). This loss of intellectual capital depletes universities of the expertise needed to drive industrial research and innovation. Best practice elsewhere has demonstrated that retaining talented individuals and attracting skilled professionals to the country is crucial for building a robust industrialisation framework within academic institutions (Barkhuizen et al., 2020). This highlights the importance of Zimbabwe creating favourable conditions for professional growth and providing competitive incentives to counter the brain drain problem.

6. CONCLUSION AND RECOMMENDATIONS

The state of Education 5.0 in Zimbabwe represents a bold, yet complex transformation of the nation's education landscape, aiming to produce academically equipped graduates capable of driving innovation and industrialisation. While significant

strides have been made in integrating the five pillars – teaching, research, community service, innovation, and industrialisation – challenges, such as limited funding, outdated infrastructure, skills gaps, and curriculum challenges continue to hinder full implementation. Despite these hurdles, Zimbabwe's commitment to reshaping its education system is evident in its strategic efforts to align education with its developmental goals, fostering a generation of problem-solvers attuned to the local context. To fully realise the potential of Education 5.0, it is crucial to intensify investment in educational resources, enhance the capacity of institutions to innovate, and ensure that the curriculum is inclusive and deeply rooted in Zimbabwe's rich cultural heritage. Through addressing these challenges, Zimbabwe can solidify its vision of a globally competitive and locally relevant education system, ultimately contributing to sustainable economic growth and social development.

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