

Addressing Skills Mismatch between University Education and Labour Market Demands in Kenya

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Abstract: *Despite the expansion of the digital economy, a significant skills mismatch persists between the competencies acquired by university graduates and those demanded by employers. Many graduates leave university with strong theoretical knowledge but inadequate practical experience, limited exposure to emerging technologies, and insufficient workplace competencies required in the modern IT industry. This study therefore focused on addressing skills mismatch between university education and labour market demands in Kenya. Specifically, the study reviewed literature on Skills Mismatch and Employability, Curriculum Misalignment, Digital Transformation and New Skill Demands, Industry–Academia Collaboration, Work-Integrated Learning and the Role of the Digital Divide. The study concludes that the growing skills mismatch between university education and labour market demands has emerged as a significant challenge to graduate employability in Kenya, particularly within the rapidly evolving digital economy. While universities continue to produce graduates with strong theoretical foundations, many lack the practical, technical, and digital competencies required by employers. This mismatch is further exacerbated by the digital divide, which creates inequalities in access to digital infrastructure, learning technologies, internet connectivity, and opportunities to acquire industry-relevant digital skills. Consequently, many graduates experience difficulties transitioning into employment despite increasing demand for skilled professionals.*

Keywords: Information and Communication Technology, Skills Mismatch, University Education, Labour Market Demands

1. Introduction

The rapid advancement of digital technologies has transformed labour markets worldwide, creating demand for new digital competencies, technical expertise, and adaptable skills that higher education institutions must cultivate to prepare graduates for an increasingly competitive workforce (Suryawanshi & Narkhede, 2022). In Kenya, the Information Technology (IT) sector continues to experience significant growth, driven by innovations in artificial intelligence, cloud computing, fintech, cybersecurity, data analytics, and e-commerce. This growth has expanded employment opportunities while simultaneously increasing employer expectations for graduates who possess practical digital skills, critical thinking abilities, and industry-relevant competencies (Okello & Chege, 2021).

Despite the expansion of the digital economy, a significant skills mismatch persists between the competencies acquired by university graduates and those demanded by employers. Many graduates leave university with strong theoretical knowledge but inadequate practical experience, limited exposure to emerging technologies, and insufficient workplace competencies required in the modern IT industry (Omondi & Mwangi, 2023). This mismatch has contributed to graduate unemployment, underemployment, reduced organizational productivity, and increased recruitment and training costs for employers as they seek to bridge the competency gaps among newly employed graduates (Ngugi & Wanjiku, 2022).

The challenge is further compounded by the digital divide, which refers to disparities in access to digital infrastructure, internet connectivity, digital learning resources, and opportunities to acquire advanced digital skills. While some universities have embraced digital transformation through

modern laboratories, online learning platforms, industry partnerships, and innovation hubs, others continue to face limitations in technological infrastructure and access to contemporary digital tools. Consequently, students graduate with varying levels of digital competence, thereby widening the skills mismatch between university training and labour market expectations (Kariuki, 2021).

Addressing the skills mismatch requires a comprehensive approach that goes beyond curriculum revision to include strengthening digital infrastructure, integrating industry-driven learning experiences, expanding internships and work-integrated learning, promoting professional certification programmes, and fostering stronger collaboration between universities and industry stakeholders. Reducing the digital divide while aligning university education with labour market requirements will enhance graduate employability, improve workforce readiness, stimulate innovation, and contribute to Kenya's transition towards a competitive digital and knowledge-based economy (Molla & Cooper, 2023).

2. Background of the Problem

Kenya has experienced remarkable growth in higher education over the past two decades, with universities significantly expanding programmes in Information Technology (IT), Computer Science, Software Engineering, Information Systems, and other computing-related disciplines to meet the growing demand for digital talent (Bai, Sarkis, & Dou, 2020). Simultaneously, the country's digital economy has expanded rapidly through innovations in fintech, e-commerce, cloud computing, artificial intelligence, cybersecurity, and digital government services. These developments have transformed employer expectations, with organizations increasingly seeking

graduates who possess practical technical competencies, digital literacy, critical thinking, problem-solving abilities, and adaptability to emerging technologies (Adhikari & Biswas, 2023).

Despite this expansion, concerns regarding the mismatch between university graduates' skills and labour market requirements have continued to grow. Many employers report that graduates possess adequate theoretical knowledge but lack practical experience, proficiency in current digital technologies, and the workplace competencies required to perform effectively in modern IT environments. This skills mismatch has contributed to graduate unemployment and underemployment, increased recruitment and training costs for employers, and reduced organizational productivity, thereby limiting the contribution of higher education to Kenya's digital transformation agenda (Rashid & Asghar, 2021).

The challenge is further exacerbated by the digital divide that exists across universities and among students. Differences in access to reliable internet connectivity, modern computer laboratories, digital learning platforms, licensed software, and emerging technologies create unequal opportunities for students to acquire industry-relevant digital skills. While some universities have invested heavily in digital infrastructure and industry partnerships, others continue to face resource constraints that limit students' exposure to practical learning environments. Consequently, graduates enter the labour market with varying levels of digital competence, widening the gap between university education and employer expectations (Omondi & Mwangi, 2023).

In addition, curriculum review processes in many universities have not kept pace with the rapid evolution of technology. Administrative delays, limited collaboration between universities and industry, inadequate integration of experiential learning, and insufficient emphasis on professional certifications have slowed the incorporation of emerging technologies into academic programmes. As technological innovations continue to reshape the workplace, universities face increasing pressure to produce graduates equipped with both technical expertise and transferable skills such as communication, teamwork, innovation, and lifelong learning (Kushwaha & Kar, 2020).

Addressing the skills mismatch therefore requires coordinated efforts among universities, industry, policymakers, and professional bodies to modernize curricula, strengthen industry-academia collaboration, expand work-integrated learning opportunities, and reduce the digital divide through improved digital infrastructure and equitable access to technology. Such interventions will better align university education with labour market demands, enhance graduate employability, and support Kenya's aspiration of becoming a globally competitive digital and knowledge-based economy.

3. Literature Review

3.1 Skills Mismatch and Employability

In Kenya and other developing economies, a persistent skills mismatch remains a major barrier to graduate employability. While universities produce technically knowledgeable graduates, employers frequently report gaps in practical competencies, professional experience, and readiness to perform in dynamic IT roles. Studies indicate that applied technical skills—such as programming with contemporary languages, database management, network configuration, and cybersecurity protocols—are in high demand, yet often underdeveloped among recent graduates (Airehrour, Kumar, & Kwak, 2023).

Beyond technical expertise, soft skills have emerged as critical determinants of employability. Problem-solving, critical thinking, collaboration, communication, and adaptability are frequently cited by IT employers as essential for thriving in complex, technology-driven workplaces (Ngugi & Wanjiku, 2022). Graduates who lack exposure to real-world problem-solving scenarios often struggle to apply theoretical knowledge in practical contexts. This gap limits innovation capacity and reduces the effectiveness of teams working on IT projects, highlighting the need for holistic educational approaches that integrate both technical and professional competencies.

3.2 Curriculum Misalignment

Curriculum misalignment remains a significant contributor to the skills gap. Several studies demonstrate that university IT programmes often lag behind industry advancements due to slow curriculum review processes and limited industry input (Kariuki, 2021). Many programmes emphasize foundational theory, outdated programming languages, and legacy technologies, offering minimal exposure to contemporary platforms, cloud environments, and emerging tools.

To bridge this gap, literature recommends continuous curriculum updating in collaboration with industry stakeholders. Strategies such as coding bootcamps, capstone projects, hackathons, and the use of industry-grade tools can expose students to practical scenarios that mirror workplace demands. Furthermore, integrating certifications—such as AWS, Azure, Google Cloud, Cisco, or CompTIA—into academic programmes strengthens graduates' market readiness by validating their technical proficiency in globally recognized frameworks (Omondi & Mwangi, 2023).

3.3 Digital Transformation and New Skill Demands

The global trend of digital transformation has reshaped the IT labor market, generating demand for specialized roles that require advanced technical and analytical skills. Literature identifies high-growth areas such as cybersecurity, cloud engineering, artificial intelligence and machine learning (AI/ML), blockchain development, data analytics, and DevOps as critical for contemporary IT workforces (Wanyama, 2022).

Employers now seek graduates who not only understand technical concepts but also possess knowledge of agile project management, version control systems (e.g., Git), API integration, and automation tools. The ability to develop scalable software solutions, maintain secure networks, and analyze large datasets has become essential. Consequently, higher education institutions must embed these emerging technologies and methodologies into their curricula to produce graduates capable of meeting evolving market expectations.

3.4 Industry- Academia Collaboration

Structured collaboration between universities and the IT industry is widely recognized as a key enabler of graduate employability. Literature emphasizes multiple mechanisms for fostering alignment, including collaborative curriculum design, participation of industry experts in lectures and workshops, co-supervised research projects, and innovation hubs where students can work on real-life industry problems (Mutua & Njoroge, 2022).

Such partnerships create a feedback loop whereby universities gain insight into current and future skill demands, and employers can access emerging talent with relevant competencies. Countries that have established strong industry-academia report improved graduate readiness, higher innovation output, and enhanced employability rates. In Kenya, the development of ICT incubation centers and university technology parks has begun to play a similar role, though coverage remains limited and largely concentrated in major urban centers.

3.5 Work-Integrated Learning

Work-integrated learning (WIL) is a practical approach to closing the gap between theoretical knowledge and workplace readiness. Models such as internships, industrial attachments, cooperative education, and apprenticeship programmes provide students with opportunities to apply classroom learning in professional IT environments. Literature highlights that experiential learning enhances technical skills, professional behavior, and familiarity with organizational workflows, thereby increasing employability prospects (Okello & Chege, 2021).

However, challenges persist in scaling WIL initiatives. Many universities struggle to secure adequate placements for all students due to limited industry capacity, competition among institutions, or lack of formalized partnerships. Additionally, supervision quality and structured learning outcomes during attachments can be inconsistent, reducing the potential benefits. Effective implementation requires collaboration between academic institutions and employers, including clear objectives, mentorship programmes, and monitoring systems to ensure meaningful skill development.

3.6 The Role of the Digital Divide

The digital divide refers to disparities in access to digital technologies, internet connectivity, digital infrastructure, and the skills required to effectively use digital tools for learning, communication, and employment. Although Kenya has made significant progress in expanding digital infrastructure and internet penetration, considerable inequalities remain among universities and students in terms of access to modern digital resources. These disparities influence the quality of education, students' acquisition of practical digital competencies, and ultimately their employability in an increasingly technology-driven labour market (Van Dijk, 2020).

Within higher education, the digital divide manifests through unequal access to high-speed internet, well-equipped computer laboratories, licensed software, cloud computing platforms, artificial intelligence tools, and other emerging technologies. Universities with advanced digital infrastructure are better positioned to provide experiential learning opportunities that expose students to current industry practices. In contrast, institutions with limited technological resources often rely heavily on theoretical instruction, reducing students' opportunities to develop practical competencies demanded by employers (Hilbert, 2021).

The digital divide also extends beyond institutional infrastructure to individual students. Differences in socioeconomic status influence students' ability to own laptops, access reliable internet services, acquire professional software, participate in online certification programmes, and engage in self-directed learning. Consequently, students from disadvantaged backgrounds may graduate with lower levels of digital literacy and technical competence despite completing similar academic programmes. These inequalities contribute to variations in graduate preparedness and widen the skills mismatch experienced within the labour market (UNESCO, 2023).

Furthermore, the increasing adoption of digital technologies by employers has intensified the importance of digital competencies across virtually all sectors of the economy. Employers increasingly seek graduates who possess practical experience with cloud technologies, cybersecurity, data analytics, artificial intelligence, collaborative digital platforms, and remote working technologies. Where universities are unable to provide adequate access to these technologies because of the digital divide, graduates experience greater difficulty transitioning into employment, thereby increasing graduate unemployment and underemployment.

Reducing the digital divide is therefore critical in addressing the skills mismatch between university education and labour market demands. Investment in digital infrastructure, affordable internet access, modern learning technologies, digital skills training, and equitable access to technology-enhanced learning environments can significantly improve graduates' practical competencies and workplace readiness. Additionally, partnerships between universities, government,

and industry can facilitate access to emerging technologies, internships, mentorship programmes, and professional certifications that strengthen graduate employability and support Kenya's digital transformation agenda.

4. Analysis/Discussion

4.1 Gaps in IT Curriculum Content

A major contributor to the skills mismatch in Kenya's IT sector is the misalignment between university curricula and the evolving demands of employers. While traditional computing subjects such as basic programming, database management, and network theory remain foundational, they are insufficient for the competencies required in modern IT workplaces. Critical fields like cloud computing, DevOps, machine learning, artificial intelligence, UI/UX design, cybersecurity, digital forensics, and blockchain technology are either underrepresented or absent in many programmes.

This gap limits graduates' employability, as they are often unprepared for the specialized technical roles that dominate the current job market. Employers increasingly require certifications and practical proficiency in platforms such as AWS, Microsoft Azure, Google Cloud, Cisco networking solutions, and CompTIA standards. Integrating these emerging topics and certifications into undergraduate and postgraduate curricula would ensure that students graduate with both theoretical knowledge and practical, market-relevant skills.

4.2 Insufficient Practical Exposure

Insufficient hands-on experience is another critical challenge. Many universities in Kenya lack adequately equipped laboratories, access to commercial-grade software, and cloud infrastructure necessary for practical learning. As a result, students often complete their studies without direct experience in developing scalable applications, configuring secure networks, or deploying solutions in cloud environments.

The absence of practical exposure also extends to collaborative project work and problem-based learning. Students rarely engage in real-world simulations, software testing, or agile project management exercises that mirror workplace scenarios. This deficiency leaves graduates theoretically competent but technically underprepared, requiring employers to invest additional resources in on-the-job training. Expanding lab facilities, virtual labs, simulation platforms, and cloud-based learning environments could bridge this gap, equipping students with skills aligned with industry expectations.

4.3 Weak University–Industry Partnerships

Although some universities have ICT research centers, innovation labs, and incubation hubs, collaboration with industry remains fragmented and inconsistent. Many institutions operate in isolation, offering programmes without regular input from employers regarding emerging skill needs. This results in graduates who may be technically proficient but

lack workplace readiness, including communication, teamwork, and project management skills critical for IT project delivery.

Stronger university–industry linkages could address these gaps. Mechanisms such as co-created curricula, industry-led workshops, mentorship programmes, joint research projects, and internships ensure that students gain relevant, practical experience. Additionally, such partnerships help universities stay updated on technology trends, enabling dynamic adjustments to teaching content and delivery methods. Countries with robust academia–industry ecosystems consistently report higher graduate employability and improved innovation outputs—a model Kenya can adopt to accelerate its digital economy growth.

4.4 Rapid Technological Change

The fast-paced nature of IT innovation exacerbates the curriculum gap. Technologies such as cloud platforms, AI/ML frameworks, cybersecurity tools, and DevOps pipelines evolve rapidly, often outpacing the traditional university module approval process. Curriculum revisions may take several years, resulting in students graduating with knowledge that is already partially outdated.

To mitigate this challenge, universities need flexible and modular curriculum models. Modular micro-credentials, online certification courses, and short-term skill development programmes can complement traditional degree offerings, allowing students to learn emerging technologies in real time. This adaptive approach ensures graduates remain relevant, reduces skills obsolescence, and enhances employability in rapidly evolving digital sectors.

4.5 Policy and Governance Factors

Policy and governance frameworks play a crucial role in shaping the effectiveness of IT education. While Kenya has instituted supportive policies such as the National Digital Master Plan and reforms in Technical and Vocational Education and Training (TVET), implementation across universities has been uneven. Funding limitations restrict investments in modern laboratories, cloud subscriptions, faculty training, and research initiatives.

Stronger oversight, clear implementation guidelines, and incentives for university–industry collaborations could address these constraints. For example, tax incentives for universities investing in IT infrastructure or subsidies for industry-academia projects can stimulate innovation and enhance skills development. Additionally, harmonizing standards for curriculum quality, practical exposure, and industry engagement across institutions can ensure a consistent pipeline of job-ready IT graduates.

5. Conclusion

The growing skills mismatch between university education and labour market demands has emerged as a significant challenge to graduate employability in Kenya, particularly within the rapidly evolving digital economy. While universities continue to produce graduates with strong theoretical foundations, many lack the practical, technical, and digital competencies required by employers. This mismatch is further exacerbated by the digital divide, which creates inequalities in access to digital infrastructure, learning technologies, internet connectivity, and opportunities to acquire industry-relevant digital skills. Consequently, many graduates experience difficulties transitioning into employment despite increasing demand for skilled professionals.

Addressing this challenge requires a comprehensive and collaborative approach involving universities, industry, government, and other stakeholders. Universities should regularly review and modernize curricula to reflect emerging technologies, strengthen industry partnerships, expand work-integrated learning opportunities, and promote professional certification programmes. At the same time, investments aimed at reducing the digital divide through improved digital infrastructure, equitable access to technology, and enhanced digital literacy are essential for ensuring that all students develop the competencies required in the modern workplace. By simultaneously addressing skills mismatch and digital inequalities, Kenya can produce a highly skilled, digitally competent workforce capable of supporting innovation, improving graduate employability, and advancing the country's digital transformation and sustainable economic development.

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