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EXPLORING DIGITAL TRANSFORMATION IN PRE-SERVICE TEACHER EDUCATION IN AFRICA: PROSPECTS, CHALLENGES, AND IMPLICATIONS FOR SUSTAINABLE LIFELONG LEARNING

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ABSTRACT

Digital transformation is reshaping pre-service teacher education globally, with significant implications for Africa. This study explores the prospects and challenges of integrating digital technologies into African pre-service teacher education, examining its impact on sustainable lifelong learning. A systematic literature review method was used to analyse research published between 2020 and 2024, identifying key trends, barriers, and opportunities. The findings highlight the potential of digital tools to enhance educational resources, innovative teaching methods, and collaborative learning environments. However, challenges such as inadequate technological infrastructure, digital literacy gaps, and institutional resistance hinder effective implementation. The Technology Acceptance Model (TAM) and the Lifelong Learning Framework provide theoretical underpinnings, offering insights into technology adoption and continuous professional development. This study presents strategic recommendations for policymakers, educational institutions, and stakeholders to address these challenges and leverage digital transformation for improved educational outcomes. The implications for sustainable lifelong learning emphasise the importance of ongoing professional development and adaptability in the evolving educational landscape. By addressing the identified barriers and implementing targeted interventions, Africa can harness the benefits of digital transformation in pre-service teacher education, ultimately contributing to developing a more equitable and effective education system.

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Introduction.

Digital transformation is a critical phenomenon that influences various sectors, including education, by integrating digital technologies into traditional practices (Brynjolfsson & McAfee, 2014). In the context of pre-service teacher education, this transformation has the potential to revolution is pedagogical methods, enhance access to educational resources, and promote collaborative learning environments (Kimmons & Hall, 2022). The rapid adoption of digital tools during the COVID-19 pandemic has further highlighted the necessity and potential benefits of digital integration in education systems worldwide (World Bank, 2021).

Africa's educational landscape, characterised by diverse challenges such as limited resources, infrastructure deficits, and socioeconomic disparities, can significantly benefit from digital transformation (UNESCO, 2020). Digital technologies offer promising solutions to these challenges by facilitating access to quality education and innovative teaching methodologies (Adedoyin & Soykan, 2022). However, successfully implementing these technologies in pre-service teacher education requires a thorough understanding of African educational systems' specific contexts and constraints (Mendelson, 2021).

Despite the potential benefits, integrating digital technologies in African pre-service teacher education faces several obstacles. Infrastructural issues, including inadequate internet connectivity and outdated technological infrastructure, are prominent barriers (Bada & Oladimeji, 2023). Additionally, many educators in Africa need more digital literacy skills to effectively utilise technologies in their teaching practices (Adedoyin & Soykan, 2022). Institutional resistance to change further complicates adopting new technologies, highlighting the need for comprehensive strategies to address these challenges (Ishak et al., 2023).

The implications of digital transformation for lifelong learning are significant, emphasising the need for continuous professional development and adaptability (Miller, 2023). Digital technologies support ongoing learning and skill development by providing access to online courses, professional networks, and up-to-date resources (Johnson & Johnson, 2022). This aligns with the Lifelong Learning Framework, which underscores the importance of continuous education and skill enhancement throughout an individual's career (UNESCO, 2020).

Understanding the dynamics of digital transformation in pre-service teacher education is crucial for developing effective strategies that support sustainable lifelong learning. This study explores the prospects and challenges associated with digital transformation in pre-service teacher education in Africa. The systematic literature review provides a comprehensive analysis of recent research on this topic, offering practical recommendations for policymakers, educational institutions, and other stakeholders involved in educational reform.

By addressing the identified challenges and leveraging the opportunities presented by digital transformation, African countries can enhance their educational systems and improve the quality of pre-service teacher education. This will ultimately contribute to developing a more equitable and effective education system, fostering sustainable lifelong learning and professional growth for educators. The study's findings and recommendations will guide stakeholders in implementing successful digital transformation initiatives in pre-service teacher education across Africa. The research questions guiding this review were:

(1) What are the key prospects of digital transformation in pre-service teacher education in Africa?

(2) What challenges hinder the effective implementation of digital technologies in this context?
(3) What strategies and interventions have been proposed or implemented to address these challenges?

(4) How does digital transformation impact sustainable lifelong learning in pre-service teacher education?

Literature Review.

Digital transformation in education involves adopting and integrating digital technologies to enhance teaching and learning experiences. Brynjolfsson and McAfee (2014) argue that this transformation can significantly improve instructional practices and student outcomes by providing new tools and resources for educators and learners. Technologies such as learning management systems, interactive platforms, and digital content are reshaping traditional educational methods, offering innovative solutions for curriculum delivery and assessment (Cakir, 2021).

Pre-service teacher education in Africa faces numerous challenges, including inadequate resources, infrastructural deficits, and disparities in access to technology (Mendelson, 2021). The integration of digital tools has the potential to address these challenges by providing more equitable access to educational materials and facilitating new teaching methodologies. However, the effectiveness of digital transformation efforts is influenced by the specific context of African educational systems, including socioeconomic factors and varying technological readiness levels (Ogunyemi, 2022).

Several challenges hinder the implementation of digital technologies in African pre-service teacher education. Infrastructure and connectivity issues are significant barriers, with many regions experiencing limited internet access and outdated technological infrastructure (Bada & Oladimeji, 2023). Additionally, gaps in digital literacy among educators can impede the effective use of digital tools, as many need more skills to integrate technology into their teaching practices (Adedoyin & Soykan, 2022). Resistance to change within educational institutions further complicates the adoption of new technologies (Ishak et al., 2023).

Despite these challenges, there are promising examples of successful digital transformation initiatives in pre-service teacher education across Africa. For instance, some programs have effectively utilised technologies to deliver educational content and support teacher training (Ogunyemi, 2022). These initiatives demonstrate the potential for digital tools to enhance teacher education and improve educational outcomes, even in resource-constrained environments.

The literature also highlights the importance of continuous professional development in supporting the effective use of digital technologies. Teachers need ongoing training and support to develop the skills to integrate digital tools into their teaching practices (Miller, 2023). Professional development programs focusing on digital literacy and pedagogical strategies can help educators stay current with technological advancements and adapt to new teaching methodologies (Johnson & Johnson, 2022).

Moreover, integrating digital technologies in pre-service teacher education can promote collaborative learning environments. Digital platforms enable teachers to connect with peers, share resources, and engage in professional communities (Garrison & Vaughan, 2021). This collaborative approach can enhance the quality of teacher education by fostering a supportive and connected educational community.

In conclusion, the literature underscores the potential benefits of digital transformation in pre-service teacher education while highlighting the significant challenges that must be addressed. By focusing on infrastructure development, digital literacy training, and institutional support, stakeholders can create an enabling environment for successful digital transformation. This, in turn, will support the development of effective and sustainable educational practices, ultimately contributing to improved educational outcomes and lifelong learning for educators in Africa.

Theoretical Framework.

Technology Acceptance Model (TAM).

The Technology Acceptance Model (TAM), developed by Davis (1989), is a widely used framework for understanding user acceptance and technology usage. According to TAM, perceived usefulness (PU) and perceived ease of use (PEOU) are the primary determinants of technology acceptance. PU refers to the degree to which a person believes that using a particular system would enhance their job performance, while PEOU is the degree to which a person believes that using the system would be free of effort.

TAM can provide valuable insights into how educators perceive and adopt digital technologies in the context of pre-service teacher education in Africa. Studies have shown that when teachers perceive digital tools as valuable and easy to use, they are more likely to integrate them into their teaching practices (Davis, 1989; Venkatesh & Bala, 2008). Therefore, addressing factors influencing PU and PEOU is crucial for successful technology adoption in teacher education programs.

Perceived usefulness is particularly relevant in pre-service teacher education, where the potential benefits of digital technologies, such as enhanced access to educational resources and innovative teaching methods, can significantly impact teaching and learning experiences (Kimmons & Hall, 2022). By demonstrating the practical advantages of digital tools, educators can be encouraged to adopt and effectively use these technologies.

Perceived ease of use is equally important, as many educators may need more time to adopt new technologies due to concerns about their ability to use them effectively. Comprehensive training and support can help alleviate these concerns and increase educators' confidence in digital tools (Adedoyin & Soykan, 2022). User-friendly interfaces and intuitive design can also enhance PEOU, making it easier for teachers to integrate technology into their practices.

TAM also emphasises the role of external variables, such as organisational port and technological infrastructure, in influencing PU and PEOU. In Africa, addressing infrastructural challenges, such as limited internet access and outdated technology, is essential for promoting acceptance of technology (Bada & Oladimeji, 2023). Additionally, institutional support, including leadership commitment and professional development opportunities, can significantly foster a positive attitude towards technology adoption (Ishak et al., 2023).

Lifelong Learning Framework.

The Lifelong Learning Framework emphasises the continuous development of skills and knowledge throughout an individual's career. This framework is particularly relevant in digital transformation, as technological advancements require educators to engage in ongoing learning and skill enhancement (UNESCO, 2020). Lifelong learning is essential for maintaining professional competence and adaptability in a constantly evolving educational landscape.

Digital technologies can support lifelong learning by providing access to online courses, professional communities, and up-to-date resources (Johnson & Johnson, 2022). These tools enable educators to engage in continuous professional development, stay current with emerging trends, and enhance their teaching practices. The Lifelong Learning Framework highlights the importance of creating a continuous improvement and adaptability culture within educational institutions (Miller, 2023).

Fostering a culture of lifelong learning is crucial in pre-service teacher education for preparing educators to use digital technologies effectively. By promoting continuous professional development and providing opportunities for ongoing learning, teacher education programs can equip educators with the skills to integrate technology into their teaching practices (Garrison & Vaughan, 2021). This, in turn, supports developing a more dynamic and effective education system.

Moreover, the Lifelong Learning Framework underscores the importance of self-directed learning and personal responsibility in professional development. Educators must actively participate in their learning, seeking opportunities to enhance their skills and stay current with technological advancements (Eshet-Alkalai, 2004). Digital tools can facilitate this process by providing flexible and accessible learning options that cater to individual needs and preferences.

Integrating TAM and the Lifelong Learning Framework provides a comprehensive theoretical foundation for understanding the dynamics of digital transformation in pre-service teacher education. By addressing the factors influencing technology acceptance and promoting a culture of continuous learning, stakeholders can support the effective integration of digital technologies in teacher education programs. This, in turn, will contribute to developing sustainable lifelong learning practices and improved educational outcomes.

Methods.

A systematic literature review (SLR) explored the prospects and challenges of digital transformation in pre-service teacher education in Africa. The review focused on research published between 2020 and 2024, comprehensively analysing recent developments in this field. The SLR methodology involved several stages, including defining research questions, identifying relevant studies, and analysing findings.

Relevant studies were identified by systematically searching academic databases, including Google Scholar, Scopus, and Web of Science. Keywords such as "digital transformation," "pre-service teacher education," "Africa," "educational technology," and "lifelong learning" were used to locate pertinent articles. The search was limited to peer-reviewed journal articles, conference papers, and relevant reports published between 2020 and 2024.

The initial search yielded many studies screened for relevance based on their titles and abstracts. Studies that focused explicitly on digital transformation in pre-service teacher education in Africa were included in the review. A total of 160 Full-text articles were retrieved and assessed for

quality and relevance, with only 38 articles meeting the inclusion criteria of articles published in English and peer-reviewed articles included in the final analysis.

Results.

The analysis involved coding and categorising identified studies to extract key themes and findings. This process included identifying common challenges, strategies, and outcomes related to digital transformation in pre-service teacher education. The findings were synthesised to provide a comprehensive overview of the current state of research on this topic. Thus, themes have been generated to present the findings of the study as presented in this section:

1. Improved Access to Educational Resources.

Digital transformation in pre-service teacher education in Africa presents a substantial opportunity for improved availability of educational resources. This encompasses digital textbooks, web-based courses, and interactive learning systems that enhance the educational experience. According to Adedoyin and Soykan (2022), these materials are vital in facilitating successful and interactive teaching approaches like flipped classrooms and blended learning. Pre-service teachers can expand their knowledge base and instructional skills by utilising various digital tools that offer diverse and comprehensive educational resources, going beyond the limitations of traditional textbooks (Cakir, 2021).

Additionally, online resources offer teachers flexibility and convenience, allowing them to access information at their preferred speed. This is especially advantageous in areas where access to physical resources is restricted (Garrison & Vaughan, 2021). Due to their asynchronous nature, online resources enable pre-service teachers to effectively manage their studies alongside other responsibilities, so promoting a learning environment that is both inclusive and adaptable. This adaptability can result in enhanced customer-customised learning experiences tailored to the specific requirements of students and fostering habits of lifelong learning.

Nevertheless, the potential advantages of digital resources are sometimes hindered by the restricted availability of dependable internet and insufficient digital equipment. Many educational institutions in Africa continue to need more technological infrastructure, which hinders the efficient utilisation of digital resources (Bada & Oladimeji, 2023). This digital divide underscores the necessity of making significant investments in technology infrastructure to guarantee that all students and teachers can reap the advantages of digital educational materials. The unfulfilled promise of digital transformation in education persists due to the need for more attention given to these infrastructural difficulties.

Addressing these infrastructure problems is crucial to fully harnessing the promise of digital resources in improving pre-service teacher education. Investments in enhancing internet connectivity and facilitating access to digital devices are vital measures. In addition, establishing supporting policies and collaborations with technology providers can assist in closing the divide. By surmounting these obstacles, educational institutions may utilise the complete potential of digital resources to revolutionizing teaching and learning methodologies, ultimately resulting in enhanced educational achievements and increased availability of high-quality education for everyone.

2. Innovative Teaching Methods.

Integrating digital technologies into pre-service teacher education enables new teaching methods to enhance learning results significantly. Flipped classrooms and blended learning approaches, supported by digital resources, offer improved interactive and student-centred learning experiences (Cakir, 2021). These tactics provide a tailored learning strategy that caters to student's diverse needs and encourages active participation (Adedoyin & Soykan, 2022). Using multimedia materials and interactive simulations can enhance the learning experience by increasing its captivation and relevance, enhancing student comprehension and retention.

Furthermore, digital technologies facilitate the creation of a flexible curriculum that can quickly adapt to changing educational needs, making it easier to update customers' ability to adapt. This is particularly crucial in the dynamic field of education, where being abreast of the latest pedagogical concepts and technological advancements is essential (Miller, 2023). Through continually upgrading digital information, educational institutions may ensure that pre-service

teachers possess the most up-to-date knowledge and abilities, enhancing their preparedness to tackle modern educational difficulties.

However, successfully implementing these innovative teaching methods requires instructors with solid competency in using digital resources. This underscores the significance of thorough training programs prioritising literacy (Garrison & Vaughan, 2021). Teachers must possess a high level of proficiency in manoeuvring digital platforms, seamlessly incorporating technology into their instructional strategies, and effectively utilising resources to augment student learning. Therefore, it is crucial for professional development programs to be an essential component of teacher education, ensuring that educators are adequately prepared to utilise digital technologies in their teaching methods.

Conversely, incorporating digital technology in pre-service teacher education has great potential for enhancing instructional approaches and achieving better learning results. Educators may establish more captivating and efficient learning environments by adopting progressive methods such as flipped classrooms and blended learning. Nevertheless, the effectiveness of these approaches relies on the level of digital proficiency among teachers, which calls for continuous professional growth and assistance. By implementing appropriate infrastructure and providing adequate training, digital transformation can enhance the education system, making it more adaptable and responsive to the needs of modern classrooms, thereby better-equipping teachers for their roles.

3. Enhanced Collaborative Learning Environments.

Digital transformation enables the creation of enhanced collaborative learning environments, fostering interaction between educators and learners. Online discussion forums, collaborative platforms, and virtual classrooms provide continuous communication and cooperation, which is essential for optimal learning (Garrison & Vaughan, 2021). These digital platforms enable the process of collaborative learning and the sharing of knowledge, which promotes the development of a tightly-knit and supportive educational community. The ability to collaborate instantly, share resources, and engage in discussions beyond the classroom enhances the whole learning experience, making it more dynamic and inclusive.

Collaboration facilitated by digital platforms also includes opportunities for professional growth, enabling educators to participate in online workshops, webinars, and peer mentorship programs. These opportunities enable the continuous improvement of teachers' abilities and ensure they stay informed about the latest educational techniques (Miller, 2023). Through these platforms, educators can build relationships with experts and colleagues worldwide, enabling them to access diverse perspectives and innovative teaching methods. Establishing global interconnectedness is crucial for fostering a culture of continuous improvement and professional growth among educators.

However, the problem is ensuring all instructors have the necessary digital literacy abilities to actively engage in these collaborative environments (Adedoyin & Soykan, 2022). Many educators may need a better understanding of digital tools or more confidence to employ them effectively. To address this problem effectively, it is imperative to provide comprehensive digital literacy training and ongoing support. The training programs should prioritise technical skills, allowing educators to navigate digital platforms, actively participate in online collaborations, and seamlessly integrate technology into their teaching methods.

The success of collaborative learning and professional development through digital transformation ultimately depends on the readiness of educators to adopt and exploit digital tools and technology. It is essential to prioritise professional development and support to enhance digital communication's effectiveness. By equipping teachers with the necessary knowledge and resources, educational institutions may create a more vibrant, interconnected, and supportive learning environment that benefits educators and students.

4. Infrastructural Challenges.

Despite the promising prospects, significant infrastructural challenges hinder the digital transformation in pre-service teacher education in Africa. Limited internet connectivity and outdated technological infrastructure are significant barriers that must be addressed (Bada & Oladimeji, 2023). Many educational institutions need more financial resources to invest in necessary technological upgrades, which restricts the widespread adoption and effective use of digital tools.

To overcome these challenges, strategic investments in technological infrastructure are required. This includes upgrading existing facilities and ensuring equitable access to technology across different regions (Ogunyemi, 2022). Government policies and funding initiatives are crucial in supporting these infrastructural developments. Additionally, partnerships with private technology providers can help provide affordable and scalable technological solutions (Ishak et al., 2023).

5. Digital Literacy Gaps.

A significant barrier that has been emphasised is the discrepancy in digital literacy abilities among educators, which severely impedes their ability to employ digital resources in their teaching approaches effectively. Many aspiring educators need more fundamental skills and confidence to effectively integrate technology into their educational settings (Adedoyin & Soykan, 2022). This gap underscores the importance of professional development activities that enhance digital literacy and teaching methods. If this gap is not filled, the full potential benefits of the digital revolution in education will not be realised.

Programs should be comprehensive and continuous, providing instructors with the essential technical skills and pedagogical competence needed to utilise them effectively (Miller, 2023). These programs should offer educators ongoing support and advanced training as they acquire additional knowledge and skills beyond the first training sessions. This technique ensures teachers can keep up with the rapidly evolving digital landscape and continually improve their skills. Continuous professional development is crucial for maintaining high levels of digital literacy and effectiveness in teaching.

It is crucial to customise programs to align with teachers' specific needs and circumstances, ensuring their relevance and practical applicability. Training modules should consider the broad spectrum of existing digital competencies among instructors and provide customized education accordingly. Additionally, it is crucial to consider contextual factors such as the current technological framework and the dynamics within the classroom to guarantee that the training is pertinent and efficient. Training programs can be more effective by aligning professional development with the specific challenges and possibilities that instructors face.

Moreover, creating a favourable learning environment that encourages experimentation and creativity might facilitate educators' acquisition of digital skills (Garrison & Vaughan, 2021). Teachers should be motivated to use innovative technologies and teaching techniques without fear of failure. Institutional support is essential, as it provides access to critical resources and fosters a culture of collaboration and continual improvement. By creating a favourable environment that offers assistance and encouragement to teachers, educational institutions can significantly enhance their educators' technological proficiency and instructional techniques.

6. Institutional Resistance.

Digital transformation in pre-service teacher education is hampered by institutional opposition to change. Many educational institutions are reluctant to embrace new technologies due to cost, complexity, and possible disruptions to existing teaching approaches (Ishak et al., 2023). < Often, the result of ignorance about the advantages of digital transformation and uncertainty of the future is this opposition. Such fears impede the development required to modernise and enhance digital-based educational approaches.

Dealing with institutional opposition calls for all-encompassing plans with outstanding leadership commitment, stakeholder involvement, and the creation of encouraging legislative frameworks (Ogunyemi, 2022). Promoting the cause of digital transformation and proving its long-term advantages requires effective leadership. Leaders must be potent change agents with a clear vision and strategic guidance for bringing digital technologies into the educational process.

Overcoming opposition also depends on the active participation of stakeholders. Institutions must aggressively explain the advantages of digital transformation and include all the players in the change process. This covers teachers, administrative assistants, students, and even parents. Institutions can encourage a participative approach to help people feel responsible and cooperate in using digital tools. Regular updates, seminars, and open forums help to resolve issues and foster agreement (Miller, 2023).

Clear rules, tools, and support also allay worries and enable a more seamless shift to digital teaching and learning models. Institutions should create thorough implementation strategies involving support systems, deadlines, and benchmarks. Providing tools and training catered to teachers' needs helps reduce worries about modern technologies' intricacy. Furthermore, supportive policy structures are crucial, encouraging creativity and offering means for technological improvements. By methodically tackling these issues, educational institutions can establish conditions fit for digital transformation, improving the quality of pre-service teacher education.

7. Strategies for Addressing Challenges.

He looked into several approaches and interventions to address the difficulties of digital transformation in pre-service teacher preparation. Investing in technical infrastructure is advised mainly since it offers the necessary tools to support digital learning settings (Ogunyemi, 2022). This investment depends on building a solid basis on which educational institutions may develop their digital capacities.

Not less vital is the provision of digital literacy instruction for teachers. By arming teachers with the required skills to use digital tools properly, such training improves their capacity to include technology into their curricula (Adedoyin & Soykan, 2022). Ensuring that teachers may use digital tools to enhance their teaching strategies and involve students more successfully depends on this professional growth.

Furthermore, the development of encouraging policy structures for technology integration is underlined. These laws should guarantee that local issues are resolved and that access stays fair, as well as inspire the acceptance of digital technology (Ishak et al., 2023). Good policy-making can close gaps and enable a more seamless application of digital tools in educational environments.

Effective digital transformation also depends on cooperation among governments, academic institutions, and technological companies. Working together, these players can build and carry out plans to integrate technology into pre-service teacher preparation (Garrison & Vaughan, 2021). Overcoming challenges and advancing the integration of digital technologies in education depend on such cooperative initiatives.

8. Maximizing Benefits of Digital Transformation.

A thorough reorganisation is needed to fully realise the advantages of digital transformation in pre-service teacher education. This strategy should go beyond simple technical investments and training courses to encourage a cultural transformation that welcomes invention and change (Miller, 2023). To fit the changing educational scene, educational institutions must foster a mindset of ongoing development by fostering experimentation with new teaching approaches and technologies.

Apart from architectural and cultural developments, using data and feedback from digital tools has excellent benefits. Through data analysis, teachers can gain a critical understanding of their teaching strategies and student learning results, guiding their decisions. This data-driven approach supports the constant improvement of teaching practices, finally seeking to increase teaching effectiveness and student accomplishment (Cakir, 2021).

Effective digital transformation in pre-service teacher preparation also calls for tackling current issues and grabbing newly presented possibilities. Teachers, legislators, and technology companies, among other stakeholders, are working together to develop solutions catering to the educational environment's particular requirements and settings (Adedoyin & Soykan, 2022).

Institutions may improve their attempts at digital transformation by including these components in a coherent plan. Adopting a comprehensive strategy combining technology development, cultural transformation, and data-driven insights can help pre-service teacher education integrate digital tools more successfully and sustainably.

Discussion of Findings.

The results of this study show the great possibility of digital transformation to improve pre-service teacher education in Africa. Digital technology can enhance the quality of teacher education and enable more successful teaching practices by giving access to a broad spectrum of instructional materials and creative teaching strategies (Kimmons & Hall, 2022). Still, the practical application of these technologies calls for addressing several important issues.

Digital transformation in African pre-service teacher education (Bada & Oladimeji, 2023) is hampered by infrastructure problems, such as poor internet connectivity and obsolete technology. An enabling environment for digital learning depends on investments in technology infrastructure. Governments and educational institutions should prioritise creating robust and dependable technology infrastructure so that digital technologies can be widely adopted.

A significant obstacle is also the differences in digital literacy among teachers. Technology integration in education may suffer if many educators lack thneed more openly apply digital tools in their classrooms (Adedoyin & Soykan, 2022). Equipping teachers with the tools they need to use digital technologies properly depends on offering thorough digital literacy training and continuous professional development opportunities.

Adopting new technology in pre-service teacher preparation is further complicated by institutional opposition to change. Dealing with this problem requires a multipurpose strategy comprising supportive policy frameworks, stakeholder involvement, and leadership commitment (Ishak et al., 2023). Educational institutions must create an innovative, flexible culture to welcome the digital revolution and encourage ongoing development.

Theoretically, TAM and the Lifelong Learning Framework offer insightful analysis of the processes of digital revolution in pre-service teacher preparation. TAM stresses the value of perceived usefulness and ease of use in technology adoption (Davis, 1989). Providing user-friendly interfaces and proving the valuable advantages of digital tools can help teachers be motivated to embrace and adequately apply these technologies.

The Lifelong Learning Framework emphasises transformation and the need for ongoing professional growth and adaptation (UNESCO, 2020). Digital technologies can help enable this by giving access to online courses, professional communities, and current resources, which help foster lifelong learning. This fits the necessity of continuous professional development and skill acquisition in the quickly changing terrain of education.

The results of this study should benefit policymakers, educational institutions, and other players engaged in educational reform. By tackling the difficulties and using the opportunities given by the digital revolution, stakeholders can improve the quality of pre-service teacher education and encourage lifelong learning. Infrastructure development, digital literacy education, and building encouraging policy frameworks for technology integration should be the main priorities of strategic projects.

Overcoming current challenges and optimising advantages of digital transformation depend on cooperative efforts by governments, educational institutions, and technology companies. Working collaboratively, stakeholders can provide a conducive atmosphere for digital learning and help support the evolution of sustainable and prosperous teaching approaches. This will thus help produce better educational results and a fairer and more efficient education system in Africa.

The study emphasises more investigation on digital transformation in pre-service teacher preparation. To offer a more complete knowledge of this issue, longitudinal research evaluating the long-term effects of digital technology on instructional strategies and educational results is much needed. A comparative study of several African nations can also reveal effective policies and best practices for integrating technologies.

Conclusion.

The digital revolution is a huge opportunity to improve African pre-service teacher preparation. By allowing access to a broad spectrum of instructional resources and creative teaching approaches, digital technology can improve the quality of teacher education and enable more successful teaching practices. However, effective deployment of these technologies depends on overcoming many significant challenges, including institutional resistance to change, digital literacy gaps, and infrastructure concerns.

Theoretical models of TAM and the Lifelong Learning Framework cleverly analyse analyses of the digital revolution in pre-service teacher preparation. By addressing the factors impacting technological acceptability and supporting a lifetime of learning, stakeholders can help properly include digital technologies into teacher education projects. This would enable improved learning outcomes and lifetime habits of learning.

The outcomes of this study have significant consequences for legislators, educational institutions, and other participants involved in education reform. Strategic activities should focus on infrastructure development, digital literacy education, and creating motivating policy frameworks for technological integration. Governments, educational institutions, and technology businesses working together will help overcome present problems and maximise the benefits of digital transformation.

By addressing the discovered challenges and using the opportunities presented by digital transformation, African countries can improve the quality of pre-service teacher training and strengthen their educational institutions. This will enable a more equitable and effective educational system that promotes professional growth and lifelong learning for educators. The research findings and recommendations should assist pre-service teacher education stakeholders throughout Africa to implement successful digital transformation initiatives.

Implications of the Study.

The results of this research have various significant ramifications for legislators, educational institutions, and other players engaged in system reform. By tackling the obstacles found and using the opportunities given by digital transformation, stakeholders can improve the quality of pre-service teacher education and encourage lifelong learning.

Developing an environment fit for digital learning depends on investments in technology infrastructure. Governments and educational institutions must give top priority to building strong and dependable technology infrastructure so that digital technologies may be widely adopted. This covers enhancing web connectivity, modernising technologies, and guaranteeing fair access to digital resources.

If we are to provide teachers with the tools they need to maximise logical advances, we must give them thorough digital literacy training and continuous professional development opportunities. Professional development courses on digital literacy and pedagogical approaches can enable teachers to remain current with technological changes and adjust to new teaching approaches.

Embracing digital transformation and helping ongoing development depend on encouraging an innovative and flexible culture inside educational institutions. Supported policy frameworks, stakeholder involvement, and leadership commitment help to solve institutional opposition to change. Schools have to set the scene that supports innovation, group projects, and new technology uptake.

Fostering a lifetime learning culture is crucial for supporting constant professional development and adaptation in the framework of digital transformation. Digital technology can support continuous learning through access to online courses, professional communities, and current resources. Teachers must participate actively in their own education, looking for opportunities to keep current with technological changes and improve their competencies.

Overcoming current obstacles and optimising advantages of digital transformation thus depend on cooperative efforts of governments, educational institutions, and technology companies. Working collaboratively, stakeholders can provide a conducive atmosphere for digital learning and help support the evolution of sustainable and prosperous teaching approaches. This will thus help produce better educational results and a fairer and more efficient education system in Africa.

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