Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.17, No.1, 2026

Exploring Options for Setting up an integrated all-inclusive National eLearning System: The case of Zambia

Billy C Sichone*
Central Africa Baptist University
*bsichone@cabuniversity.com

Abstract
The study aimed at exploring available options for establishing a versatile national integrated all-inclusive[1] digital eLearning system. It also proposed a countrywide digital system perceived appropriate for Zambia from among several options. This qualitative study relied on two primary theories including Change management and Rogers' model to advance a proposed approach for installing an integrated digital educational ecosystem. To arrive at the initial sample of 18, the enquiry identified participants via stakeholder mapping before applying purposive sampling upon varied potential study informants that included HEA accredited HEIs, independent experts and relevant government units. An inclusion and exclusion criteria was used to select the final sample. The research found that a centrally coordinated integrated ecosystem was ideal to expand learner access to quality education, narrow digital divide and collate strategic data. The enquiry also found that half of respondents (52%) felt a Zambian owned integrated digital learning installation (ecosystem) was best. Additionally, the study further found that several other digital systems and approaches existed in country and had been used by industry players but centrally mobilized multi-sectoral interdisciplinary coordination lacked. The study concludes that an integrated eLearning system is a necessity needing urgent establishment by a government led consortium of stakeholders (54%). The research also concludes that lack of dedicated regular funding, contextual eLearning policy, supporting and enabling structure and effective leadership (champions) contributes to hindering eLearning growth and development in the country. The study recommends that Government leads and facilitates specific eLearning policy formulation, national coordination, skills training, provide for dedicated guaranteed funding, ongoing research, stakeholder engagement for development, ongoing sensitization, designing and setting up (installing) this digital hub to universally serve all educational institutions countrywide thus contributing to the SDG # 4, 'Universal education access' quest**.**
Key words: Project; Monitoring and Evaluation (M&E); Internet Service Provider (ISP); Digital Infrastructure; eLearning; Stakeholders; Artificial Intelligence (AI); Learning Management System (LMS); Information Communication Technology (ICT)
DOI: 10.7176/JEP/17-1-02
Publication date: January 30th 2026

Introduction

This study explores possible options available to Zambia in building a robust contextually relevant integrated and sustainable eLearning system nationally accessible to all levels of educational institutions. Setting up such a shared national backbone can be challenging because of multiple issues a given context presents during the system installation process. This enquiry investigates the possibility of assembling an educational 'one-stop-shop' where all learning institutions in Zambia from nursery all the way to tertiary level have unfettered equitable free or near free access to quality educational content, teaching and learning. Ideally, a good functional digital ecosystem should enable efficiency and expanded access to education. The research also reviews various implementation options[2] while proposing an appropriate contextual model. Several aspects are considered prior to embarking on the implementation of such a mammoth country wide project. Equally, a multiplicity of stakeholders ought to be identified, engaged, and consulted from the outset to ensure buy in for sustainability. From the inception, all these elements must meticulously be managed to yield a robust seamlessly functioning digital system. This proposal takes cognizance of valuable existing initiatives like the tier 3 National Data Centre, ZAMREN, ZEdupad (Mwabu), Smart Zambia project, other ISPs, functional laid country-wide fibre optic cable system or other strategic potent technologies (installation). Historically, learners had to physically attend class where a better equipped instructor taught. In time, correspondence and distance learning modes emerged. Today we are talking about virtual learning in cyberspace. We have no clue what comes next but for now, virtual learning is trending and demands immediate attention. All to say, dynamics have changed and there is need for a system that facilitates learning and teaching in such a volatile environment since archaic manual systems can neither efficiently or effectively work at scale.

Statement of the Problem

[1] i.e. from nursery to tertiary education level there by expanding access to excluded populations.
[2] i.e. from other similar contexts

As a result of highlighted changes in recent years, new challenges have emerged creating a gap this study explores. Clearly, the relatively static educational historical setting, was slow, bureaucratic, strictly observed laid down standards and is distinct from the current fluid dynamics on the ground, leveraging ICT. These shifts have disrupted previously stable educational foundations and assumptions because students now have unfettered access to information much easier than before and to some extent, can access educational content. This identified gap is undesirable because while we continue using (and venerating) old standards, reality on the ground is different making the ancient standards appear obsolete, archaic, inefficient, and unhelpful. Were we to rapidly move into this new arrangement, we would soon discover that relevant policies were either absent or obsolete further impeding progress. While commendable digital development efforts exist, these are fragmented with different players working in isolation in the quest to mitigate emerging challenges. Apart from that, multiple challenges face the education sector today given these mutations (Kapepe, nd; Namaiko, 2020). These challenges impede progress. For instance, a situation has arisen where a large population desire access to quality education but are unable to, as existing infrastructural capacity remains a limiting factor. To mitigate this, government policy allowed for ICT integration in 2006 and 2019 (MoE, 2019). Further, the hali access network 2023 Zambia report stated that only 3.2% of potential students accessed higher education down from 46% (lower secondary) to 29% (senior secondary). It highlighted that several factors, including infrastructure insufficiency, accounted for this. Of those accessing internet network in their locality, most probably may not afford a sustained resilience to pursue their educational dreams given their limited financial resources. Presently in Zambia, no known national digital educational system exists catering for all levels of education. While the ZAMREN network caters for HEIs, other levels (i.e. Nursery to Secondary school) are technically excluded (or part of a piecemeal arrangement) and patrons (in this bracket) are only initiated much later in life. Others even never get exposed at all. A final issue worth highlighting is the changing credentialing process. In Zambia, that is not yet a reality, but definitely on the way. How can we achieve the same desired educational outcomes in graduates, comparable, if not exceeding those attained in the past via old systems? How can we get there, given the current volatile status where things are in ferocious flux, fast paced, efficient, and information is readily available? A solution is required and Zambia urgently needs to respond to this problem.

Study Rationale and Objectives

The study explores the highlighted problem with a view to offer a possible solution. The rationale is that an efficient versatile educational system is needed to facilitate achievement of desired graduate outcomes while assessing several different options. Three objectives help resolve this problem:

1. To identify the educational processes and systems currently in use in Zambia today.
2. To explore options and evaluate possible approaches used by others.
3. To propose a contextually appropriate solution for Zambia

Research questions

To address and achieve those objectives that, relevant and connected questions are raised:

1. What educational systems and facilitating processes exist and are currently used in Zambia today?
2. What options exist in Zambia and elsewhere?
3. What suggested options could best work for Zambia?

Significance and contributions of study

The Significance of this study lies in a number of areas. We highlight a number significant points:

1. First, data generated from this study will be available for educational decision makers. They have a basis upon which to make strategic decisions. Thus, planners, thought leaders, educators or system designers will have basic data of what is going on in Zambia.
2. This consideration brings this subject (eLearning and attendant systems) to the fore. In other words, it highlights and contributes to the on-going conversations not only in Zambia globally as well.
3. The enquiry contributes to the existing body of knowledge particularly in Zambia making it extremely importantly unique. Though we are not solving everything about this eLearning access matter, we are contributing to enhancing already established educational systems.
4. Derived data from this study generates empirical evidence specifically for the Zambian context. Presently, relatively little has been published by Zambians on Zambia for Zambians. Thus, this report

contributes and helps to cause, source, sort out a problem bugging this country. Not many people presently realize the educational process crisis but this study highlights a number of key issues worth considering.

Closely connected to the highlighted significance are the study contributions. The enquiry triggers thought, discussion and reflection as earlier highlighted. Furthermore, the enquiry also contributes to the necessary documented empirical data on Zambia relating to an integrated national eLearning system. Finally, the paper adds to the extant body of knowledge, not only in Zambia, but globally.

Literature review

A study of this nature, complexity and magnitude demands a lot of background reading, consulting, reflection and research, appropriately called literature review. In this review, we simply evaluate what other people have directly or indirectly observed or said on a given subject, their conclusion, thought or finding. During the review process, researchers ensure that before writing on a subject (or making claims), they actually have identified a clear gap, addressing a matter not previously addressed or needs further attention, in the process contributing to the existing body of knowledge. To execute this review, we consulted a number of relevant studies speaking to this subject, especially from countries where a national eLearning system was installed. To enrich the enquiry it also reviewed institutional eLearning set up reports from various peer countries to glean helpful insights.

Historical Setting

There is need to trace educational historical developments and standard pedagogical practices before proceeding to a consideration of a contextually appropriate all-embracing/inclusive digital national educational system that includes, integrates and affects the entire country. At one time, education was provided in basically one way and classical instructional approaches were firmly entrenched (Omwenga et al. 2004). Learners had to go into a physical classroom to be taught. Then distance learning came along but superseded by emerging modes we now encounter. Presently, we are now talking about virtual learning in cyberspace. However, there is need to have a versatile scalable digital educational ecosystem that works in a ferociously evolving environment. The old manual systems cannot efficiently or effectively work needing urgent replacement. Historically, when learners commenced their formal education, at whatever level, one thing was very clear from the outset; they needed to enter a physical classroom of at most, 40 students, take lessons and receive instruction from a physically present 'all-knowing teacher' that passed down information to passive but eager learners. These students submitted hard copy assignments, read hard copy books and deposited paper assignment scripts at a designated 'pigeon-hole'. The teacher fetched and after grading, most likely put them back in pigeonhole from where students collected. At other times, the teacher instructed learners to submit hand written or typed assignments, slip them under the instructor's office door hoping that the teacher would find them. Evidently, everything was manual and to some extent, still is today in some settings. In such a scenario, physical contact with instructor was unavoidable as the learner had to converse with the teacher in person, submit hard copy work and physically be present in the traditional brick and mortar classroom to receive instruction. Consequently, the system was inefficient, bureaucratic, slow and decision-making lagged. Additionally, the age-old standards were religiously guarded and venerated as sacrosanct. Anybody that deviated from these generated trouble for themselves. Thus, bureaucracy, red tape, and all sorts of inefficiencies were normative. In fact, these were the best available systems at the time: slow but reliable that eventually worked despite inefficiencies in and of themselves. That was the standard for a long time before any other alternative means emerged.

Emerging and current trends

In recent times, things have and continue to change. In the past, everything appeared relatively stable and one instinctively knew what next would occur and sometimes could place their finger at what stage in the cog or the system the desired output lay. However, the world is now rapidly evolving and corresponding efficiencies kicking in resulting in easier and faster processes given recent ongoing business, environmental and technological transformations even affecting the education sector in the process. What would these changes include? First, the dynamics have altered. The assumptions, foundations, cogs in the chain, route that would take has changed. Secondly, the disruptions taking place in the context today, are effecting shifts to established foundations and how people learn, disseminate knowledge or teach, among others. All these are rapidly mutating, including how educational content is accessed. Additionally, in a digital age, a lot of information is now easily accessed and freely available, given the multiple sources. Each one of these information outlets claims to be authentic. These developments are significantly affecting the education sector more than previously imagined. Furthermore, the emergence of educational technology (edtech) has contributed to these efficiently evolving trends as daily, newer software programs emerge potentially making education efficient, easier, faster and cost-effective in the long-run. In that sense, edtech has massively contributed to the transformation of things. Part of

these newly acquired efficiencies include how students and other patrons access and manipulate information. Apart from easily accessing (and read) educational materials, content is secure and easily managed via cloud server option. Teachers no longer lose scripts as all the data is securely stored away in the cloud and accessible anywhere, anytime. These systems have increased access, not only to education, but to all other relevant information for research and other purposes. Collectively, all these trends are impacting education in more ways than one. For instance, software can now respond and answer basic queries (with increasing complexity), generate reports, converse etc., which were previously impossible. At the click, audio or within texts can be generated via chatbots. This is certainly remarkable. This emerging scenario calls us to respond to remain buoyantly relevant. Note that having the right financial resources or hardware alone did not suffice hence the necessity of involving as many stakeholders from inception (Omwenga et al., 2004; Sichone, 2023). A new project grapples with several challenges despite the best of intentions and careful execution. Bugs will always show up one way or the other, along the implementation phase as dynamics have and continue to change.

Description of proposed integrated eLearning system

This study proposes the installation of an integrated digital educational system catering for all educational levels from the basic levels (i.e. nursery) all the way to tertiary. It includes all systems in between this continuum. This adopted system should ideally narrow the existing digital divide, gap that has resulted in the systematic exclusion of some parts of the Zambian educational system. While attempts have in the past been made to close this gap, the reforms have not been sufficiently comprehensive or strong enough. Commendable efforts like the integration of ICT in curriculum during the late 1990s and early 2000s for secondary level were good policy directions demanding training and attendant supporting structures to be effective, though they largely remained at policy declarative level (Kapepe, nd). For a long time, well-equipped computer labs lacked or were poorly stocked, even worse in rural areas where computers were a rare sight, and if present were usually obsolete, in disrepair or negatively affected by erratic power outages. In some areas, power completely lacked or supply was inconsistent. While working with/in World Vision International (Z), this researcher at one time participated in donating computers (on behalf of WV) to a rural school in good faith, only to discover power had been disconnected at the said government institution for not settling outstanding bills. This scenario is hardly surprising in outlying areas, further widening the already yawning digital divide. Not only are there resource impeding factors, there is a scarcity of trained teachers with requite essential digital fluencies (Konayuma et al., 2023). On the other hand, the urban centres are comparatively better served in many senses, though equally bugged by inadequate digital infrastructure and insufficient workstations (Konayuma et al., 2023). Even with the advent of mobile technologies, the vast majority cannot afford access to strong, fast consistent internet connectivity due to high bundle cost. This calls for a system that will, among other things, make digital access nationally possible through the provision of a stable, low cost versatile, offline operable system that institutions can freely and seamlessly plug into and out. Today, internet access is a critical element for eLearning to flourish. Further, for security reasons and for AI development purposes, it is essential for the country to own, manage and utilize its own infrastructure. While other options may offer convenience and short term lower costs, the country does well to manage, control its own digital systems and attendant data.

This proposed national integrated educational digital ecosystem should have several basic features such as capability for video live streaming, allow for both synchronous and asynchronous modes of learning and teaching, iterative, generate relevant analytics, easy to access and use anywhere, anytime, among other desirable attributes. Furthermore, the adopted system should easily sync with other devices, is secure and able to store, sort, analyze, collate data for strategic purposes such as planning for timely appropriate interventions by relevant educators.

The need for a national backbone is beyond debate in the contemporary digital world and the question at this stage is not whether a system is needed but what type and how to install one. Given that the once tried and tested processes and pedagogical means are now not as appropriate, contexts must wisely navigate an unbeaten path to consolidate relevant, organic, flexible and yet functional one. The adopted system should answer to several stakeholder needs and considerations such as:

a. Enhancing efficiency needs. Perceived benefits are important to identify and highlight.

b. Answering the equitable access need where excluded populations are catered for. Included in here are people in ‘hard to reach’ geographical rural locations, differently abled individuals or those of low means.

c. Iterative, resonating easy systems that anyone, irrespective of age could use from nursery to University

d. Scalable system that allows for customization is, upgradeable or easily synchs with third party systems.

e. Flexible, versatile LMS with various functionalities like discussion forums, repository, alerts, exam management features, assignment submission and retention etc.

f. AI supported allowing for intelligent tutoring, tutorials, quizzes, assessments, auto grading, chatbots etc.

g. Ability to live stream

h. With capabilities to facilitate synchronous or asynchronous learning.

i. Strong and fast internet capabilities with sufficient bandwidth

j. Able to function on and offline. Uses low power, reduces carbon footprint and easily syncs with devices from 2G upwards.

k. Supported with alternative power sources e.g. solar, battery etc.

l. Accessible anytime, anywhere with whatever device (2-5G) including mobile smart phones, tablets etc.

m. Clear and able to host increasing student numbers without glitches, freezing, locking out or dropping.

n. Analytics to track learner progress. The AU (2022: 11) report (SO4) syncs with its stated goal "effective management and analytics for education". The said report further states that: "Education data and analytics for decision making at national, sub national and institutional…."

o. Ability to function as school management system for exams, assignment submission, student records, payment histories, communication system, data transfers (e.g. import & export options) etc.

p. Secure and not susceptible to hacking, record tampering, manipulation or such undesirable elements.

q. Cost effective (both use and acquisition)

This proposed system appears idealistic and rarely is found in one holistic all-comprehensive integrated system. At times, an institution may need multiple auxilliary supporting systems seamlessly synching into the main central hub. The fewer these external 'add-on' systems are, the better because, if they are too many, challenges such as incompatibility may arise. An example will do. In 2001 or shortly after, Microsoft ran Windows 'XP' on PCs that functioned relatively well but when higher versions with more advanced features like graphic interfaces surfaced, XP did not sync well with them and eventually was phased out. Upgrades and software updates often lead to that but not always. Another example is in order. Apple ran a series of iOS versions (1-9) that were automatically upgradeable but at some point, these reached their limit and had to be discarded by users to buy new updated devices. Same thing happened with Black Berry (OS by RIM) and Nokia (Symbian) years ago. This scenario often occurs when newer advanced software is not compatible or linked with the older version. This suggests that periodic soft and hardware upgrades are essential and inevitable but at some tipping point, may require a total overhaul to advanced emerging newer, more versatile systems. From researcher experience, new installations rarely seamlessly work the first time but may need twerking, adjusting, trouble shooting, updating, upgrading and at times, discarding or in extreme cases, entire system replacement.

From sources consulted during this study, a number of options exist to enable contextual best internet connectivity access. Macra (2021) lists at least two options to access Education via the internet are stated below:

1. Fibre optic cable (p14)- Aeriel Fibre: Overhead cables

-Under water fibre: Underground cables

Macra (2021:17) states some positive aspect of this technology when opining: "From a technical point of view, although fibre remains the technology with the highest carrying capacity…"

2. Backhaul

- Microwave: ground 'dish' to satellite. According to Macra (2021:17), "microwave is the most deployed, particularly in Africa…"

- Satellite (e.g. Starlink): direct mobile satellite connectivity any-where on the planet (P18)

Macra (2021:19) states, in relation to this newest option thus: "Satellite now appears to be the most appropriate solution for rapid deployment in remote areas (Broad coverage, multiple…"

Theoretical framework

Part of the literature review is identifying a best fitting and relevant theoretical framework undergirding the study, in the quest to install a system likely to best serve the Zambian context. The adopted theory informs and

improves the study. A number of available theories could be summoned, but used two of them named the Rogers model and Change management. The former theory (i.e. Rogers model) was used by Omwenga et al. in their 2004 study. This particular research took place at the University of Nairobi, where eLearning implementation took place. The study highlights the challenges and successes encountered along the project implementation years. This Kenya report offers key insights into an African context and suggesting what to take into consideration. The said report ends before project close out but proffers valuable insights. Another helpful study is from Tanzania tracing implementation processes and steps over many years. After a decade, the Tanzania project was nowhere near completion but had significantly transformed the institution (Iringa University College). This study highlights unique challenges faced in Africa. Figure 1 below is excerpted from this Tanzania report highlighting these mind mapped insights:

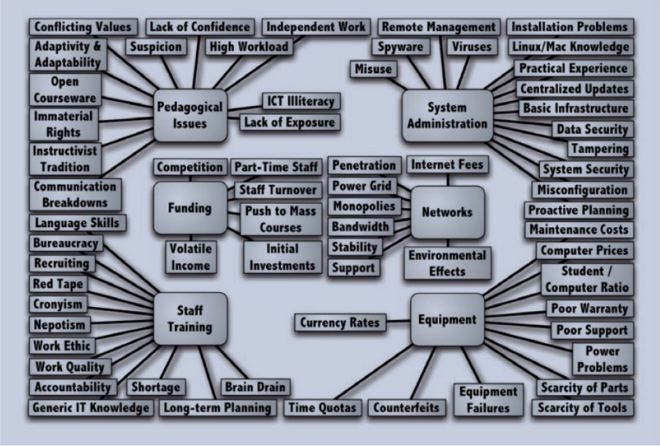

Figure 1: Sample challenges in a developing global south context
Source: Tedre et al. (2010)

On the other hand, the Change management model is a helpful companion theory relevant to this study. This theory basically posits that change is resisted, often takes time and in stages, hence the need to tread wisely. It also states that change takes effect in different ways given context uniqueness. To successfully implement effective and permanent change, tact is essential buttressed by strong leadership, stakeholder engagement and a shared vision. Change management theory proffers a generic concept as demonstrated in Figure 2.

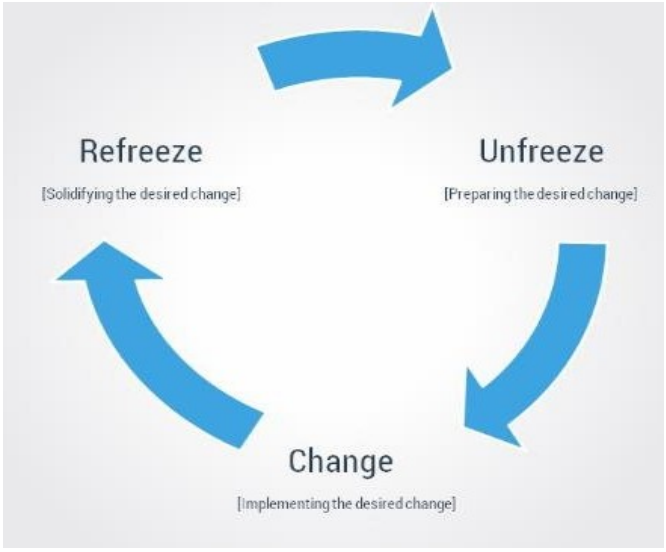

Figure 2: Stages in Change cycle
Source: Adapted from Kurt Lewin (1940s)

This theory is relevant to this research because implementing an all-inclusive integrated digital system requires

mentally and practically transitioning people from manual to digital realms. Other elements like culture, vision and perceived benefits come into the equation where (power & cultural dynamics) theories like Hofstede become handy, though not directly referenced in this study. In general, the adopted theoretical framework must be appropriate, make sense, and offer insights or get researchers to easily operate. These two theories and others (e.g. stakeholder) guided this study towards proposing the best fitting integrated national eLearning system for Zambia.

Expected challenges during Implementation Process

(a) Experiences from other (similar) contexts

Various reports were gleaned and showed a variety of approaches to eLearning system installation at different levels within varied educational systems across the continent, region and country. These studies also highlighted contextual issues and challenges encountered during implementation and adoption process. We highlight a few of them in this section: In Uganda (Makerere University), Suhail and Mugisa (2007) explored the implementation of eLearning in low bandwidth environments. They found that various dynamics (socio-economic, cultural, resources etc.) came into play and needed to be meticulously managed. Their report further showed that eLearning triggered contextual and practice changes contributing to the mitigation of rapid disruptive environmental changes consistently affecting the world. Further, their study highlighted unique contextual challenges, ideal desired LMS features and suggested the ACTIONS[1] (acronym) framework for system implementation in less resourced contexts. Another report from within Uganda by Kahiigi et al. (2008) highlighted a system implementation process. The enquiry argued for the need of a countrywide system to facilitate eLearning. They opined and concluded that the lack of a national data backbone impeded progress. Another study by Abera et al. (2023) conducted a similar study but focused on low resourced universities in both Rwanda and Ethiopia. An interesting report by Barasa highlights a national data collection system in Kenya acronymed NEMIS[2] that collates educational data across the country. This is a very interesting occurrence worth studying for possible replication in Zambia as this study attempts. Additionally, Omwenga et al (2004) traced the implementation of an eLearning system at Nairobi University over a period of time. Valuable lessons were learnt including elements uniquely faced by African contexts, akin to those highlighted by Suhail and Mugisa (2007). The value of this particular research is the need for patience, persistence, stakeholder engagement and collaboration during the implementation period of an apparently novel disruptive technology. Yet another study was gleaned from Tanzania where Tedre et al. (2011) implemented a digitization program at Iringa University College for over a period of 11+ years. Even after that period, a lot still needed to be done. Their effort generated a well-illustrated mind-mapped conceptual model (i.e. Figure 1) that helps researchers (at a glance) know issues likely to be encountered. In Zambia, Mukosa and Mweemba (2019) highlighted the existing digital divide in Zambia whose solution lay in digital infrastructure investment. Another case from within Zambia was by Kunda and Khunga (2021) that generated an insightful report of implementing a networked consortium of Research and Educational for HEIs to cost effectively access internet in a land locked country. Their recommendations on Zambia highlighted essential critical success factors for a sustainable situated NREN. This study demonstrates that networks lead to some sort of 'crowd funding' consortium resulting in overall lower costs for stakeholders. This is a form of economies of scale. According to Konayuma et al. (2023), Zambia is still low on essential updated digital infrastructure, skills and capacity despite years of implementation in HEIs. Konayuma et al. (2023) further opine that country needs to invest in human capital and attendant supporting structures. Yet another report within Zambia by Kaumba et al. (2021) explored enablers and disablers of ICT integration in 5 rural primary school contexts of Zambia (Mwinilunga). The study concluded that such contexts faced multiple challenges including lack of qualified teachers, infrastructure (e.g. computers) or reliable electric power supply (Kapepe, nd). Designers need to take highlighted elements into consideration before implementation. Gunga and Ricketts (2007) explored the possibility of fostering eLearning in African HEIs through collaborations and networks via public-private partnerships (i.e. stakeholder engagement) while highlighting contextual challenges faced by African Universities. The value of their work is that it aimed at solving two identified problems: weak policies and infrastructural barriers. In Cameroun, AFROHUM (2020)[3], with support of USAID reported how they built capacity in 17 universities, supported digital infrastructure development, training and collaboration for effective eLearning in that country. The report concludes that challenges always exist in transitioning to and installing an eLearning system. Mujawar and Mujawar (2021) carried out a study on the efficacy and importance

[1] The acronym ACTIONS stands for: A=access; C=cost; T=technology; I=interactivity; O=organization; N=novelty and; S=speed

[2] NEMIS stands for: N=National; E=Educational; M=Management; I=Information; S=System. This system collates all data from primary, secondary and tertiary but leaves out others like nursery etc. A great system, in our view.

[3] AFROHUM report accessible at: https://afrohun.org/wp-content/uploads/2023/04/Cameroon-E-Learning_Final.pdf, Accessed on 30th December, 2024.

of eLearning platforms in India. They found that younger cohorts were more open (and thus more likely to adapt) to technologies than the older. This finding is consistent with what Sichone (2023) found for the Zambian context and valuable in the design of a context fitting system. Another study by Choudhury and Das (2020) explored the development of an eLearning system for ODL. It found that excluded populations north-east of India could only access education through eLearning, hence its necessity and strategic nature. Digital Divide is therefore mitigated with eLearning options. Further, a qualitative study was conducted in Ghana by Ansong et al. (2017) to establish adoption trends of eLearning in their context. The sample of 450 respondents revealed that eLearning is yet to be fully adopted and that most platforms were used for viewing academic progress ('marks and grades') and the low 'patronage' was blamed on weak orientation and insufficient stakeholder engagement (e.g. sensitization & training).

(b) Likely challenges in Zambia

The project is likely to experience several false starts and often does not work seamlessly perfectly the first time. In the digital age, efficiency is key given the ready accessibility and availability of information. An efficient means is required thus making the difference between success and failure. Consequently, intimations towards system necessity is hardly surprising and not to be dispensed with. Tedre et al. (2010) opine that implementations are fraught with contextual challenges but the proposed system mitigates several other challenges despite its imperfections. The system is essential for a number of reasons including:

a. Digital system idea being consistent with emerging global trends and direction.

b. Resultant process efficiencies yielded.

c. Data collation, harvesting etc., for planning, AI (big data), Analytics etc.

d. Enables collaboration, synergies, networking and research.

e. Decision making tool.

f. AI for development ([AI4D] e.g. Intelligent tutoring etc.).

g. Expands and enables universal access to education for all, thus equitable. Excluded populations engrafted/integrated.

h. Strategic data available at finger tips in record time.

i. Cuts or eliminates redundancies.

j. Fosters networks and linkages across the globe e.g. Commonwealth of Learning (COL).

k. Secures data with local controls around domestically generated data.

Expected challenges (in African context)

a. Funding hiccups.

b. Evolving team dynamics or even dysfunction (e.g. stakeholder disengagement, weak leadership, political interference etc.).

c. Political will or the lack there of.

d. Leadership and mandate lack (champions lack).

e. eLearning policy lack (though a strategy exists for TEVET [nd] by MOTS).

f. Lack of enabling support structures.

g. Delays.

h. Skills (low digital fluency) gaps e.g. Low AI experts, low human capital.

Suggested solutions to mitigate highlighted challenges

1. Execute needs assessment for both qualitative and quantitative. This determines the needs and right building blocks for the proposed system. AU (2022:25) states that elements essential to this system are "building blocks for digital education in Africa".

2. Stakeholder engagement (from inception and ongoing).
3. Assembling and constituting a competent diversely multi-skilled team led by a strong, competent, good, mature, strategic, seasoned, astute, agile and gifted project team leader(s) with relevant technical skills, leadership and project management attributes.
4. Empower the mandated team (in 3) with clear Terms of Reference (TOR) and realistic targets.
5. Aggressive and stable resource mobilization.
6. Specific timeline/cycle (How long will project take from start to finish?).
7. Implementation schedule/plan (sequence and steps. A Gantt chart is ideal).
8. Strong/robust Monitoring and Evaluation (M & E) system e.g. use indicator tracking table, activity tracking table etc. Figure 3 shows a generic design cycle with M & E embedded.

Figure 3: Programme and Project Management Cycle
Source: Adapted from the World Vision International LEAP hand book (2009) available at: https://www.wvi.org/sites/default/files/LEAP_2nd_Edition_0.pdf

9. Dedicated full time paid project staff manage daily operations during implementation.

Sichone (2023) found the above stated elements as essential for the Zambian context.

Success factors[1]

- 'Dedicated physical networks interconnecting clients and research institutions'.
- 'Coordination mechanisms for member participation'.
- 'Dedicated staff, engineers to manage and maintain system'.
- 'Active support from govt. (Funding)'-stable and growing donor base.
- 'Active support from Telecom regulators'.
- 'Active support from infrastructure providers'.
- 'Cooperation with other NRENs…e.g. Ubuntu.Net'.

[1] As advanced by and adapted from : Kunda & Khunga, (2021) and AAU, (nd). These sources were most insightful. I have basically borrowed their insights

- 'Training & skills for Tech staff…'
- 'Formal agreements' to firm up issues.

Another source (AU, 2022) includes the following key elements:

- -Dedicated ASN
- -Dedicated IP space for NREN

Methodology

Successfully executing a study of this nature demands not only a sound correct fitting theoretical framework, but the design for collecting data should equally be correct. The methodological design is 'how' the project will be executed including data collection tools, storage, analysis, sample (size) selection, interpretation and report etc. All these elements are taken into account in the 'methodology' that explains the adopted approach which, in this case, is primarily qualitative (with limited quantitative elements). The reason for this is because the study elicited opinions, thoughts, desires, individual preferences with vested interests and have interacted with or been involved in setting up an educational system before. What they verbalize and opine is critical. Additionally, a qualitative design is preferred and consistent with what experts like Creswell (2012), Berg (2009), and Patton (2002) have opined. In their view, where opinions, thoughts, and inner motivations, are sought, a qualitative study design is best. As for the chosen sample size, a small specific initial sample (of 18) is sufficient and composed of people that know what a system can do, type and things implementers need look out for in a system. To arrive at the initial sample, stakeholder mapping was conducted to identify possible relevant entities for inclusion. This stakeholder mapping preceded purposive sampling within selected institutions and ensured individuals offered relevant information. An environmental scan (i.e. stakeholder mapping) was initially conducted to determine possible participants meeting at least 3 of the following key criteria traits:

a. Had been in teaching profession for at least 7 years (i.e. prior to 2025). This ensured participants were already serving pre and post Covid-19.

b. Was part of a standards setting community of practice, institution or educational venture.

c. Had prior exposure to or had interacted with an LMS in some form of eLearning. Experience in teaching or learning through a digital ecosystem was preferred.

d. Had been part of a digital system installation team directly or indirectly.

e. Had (currently or historically) administrative authority at an educational institution.

f. Was an accomplished independent expert in ICT or related fields.

The said sample consisted of HEA-accredited institutions, experts and other entities (such as government, NGO etc.) with prior connection to setting up or use of educational digital systems. Thus, respondents could be in government, private or quasi-government sectors. Table 1 shows the initial selected sample description:

Table 1: Sample description

Institution	Type of institution	Role/Function
HEA	Gov.	Accreditation & QA
MOTS	Gov.	Digital enabler
DODE	Gov.	Standards ODL
Northrise University (NU)	HEI (pvt)	Research & Ed
Expert 1		Independent pract.
Expert 2		Independent pract.
Expert 3		Independent pract.
Expert 4		Independent pract.
African Christian University (ACU)	HEI (pvt)	Research & Ed
Kapasa Makasa University (KMU)	HEI (p)	Research & Ed
Copperbelt University (CBU)	HEI (p)	Research & Ed
ZCASU	HEI (p)	Research & Ed

UNZA	HEI (p)	Research & Ed
Chalimbana Universit	HEI (p)	Research & Ed
Mulungushi University (MU)	HEI (p)	Research & Ed
ZICTA	Gov.	ICT regulator
Mukuba University	HEI (p)	Research & Ed
Africa Research University (ARU)	HEI (pvt)	Research & Ed
Expert 5		Independent Pract.
Expert 6		Independent Pract.

Source: Research Data (2025)

Selected participants should have been in that substantive locality and position pre and post Covid-19 pandemic outbreak, and thus easily discerned the differences. The data collection tool adopted and used was an interview guide, given study nature. Three approaches were used to collect data: 1. Phone call 2. WhatsApp and 3. email. All the three were helpful and used in response to informant preference. During each interview, recording and storage took place in paper or digital form. Recording, storage, review, sorting, predetermined categorizing, analysis and interpretation followed before report generation. Saturation at around # 12 informant was reached through validity and reliability was enhanced by the selection of varied sample participants, and in a few instances, more than one informant from the same institution was recorded after snowballing. This was a form of triangulation in itself. The ensuing section presents the study findings.

Findings

Having successfully collected data, the findings are now presented. The section exactly states what was found without any interpretive comments. This data is stated differently, either in graphical form, narrative, descriptive statistics or in tables for clarity. Table 2 summarizes what was found. Note that some sites had more than one relevant respondent hence the apparently inflated numbers.

Table 2: Summary of study findings

=F36/A34*100

	A	B	C	D	E	F	G	H	
					1	2	3	4	
		Respondent	Type of in	Public/pri	enhancing	suggests i	lists or of	Place of st	Govt
1		Expert 1 (Chembe)	Pract.						
2		Expert2 (Mbale)	Pract.						
3		Expert 3 (Kalezhi)	Pract.		1	1	1	1	
4		Expert 4 (Zimba ZCASU)	Pract.						
5		Expert 5 (Nicholas)	Pract.		1	0	1	1	
6		Expert 6 (Kaira)	Pract.		1	1	1	1	
7		Expert 7 (M Musonda)	Pract.		1	1	1	1	
8		Expert 5 (Kunda)	Pract.		1	0	1	1	
9		DODE	Gov.		1	1	1	1	
10		MOTS (Mutale)	Gov.	Gov.					
11		HEA (Chiyala)	Gov./Prac	Gov.	1	0	1	1	
12		KMU (Jere)	HEI	P					
13		Chalimbana (Kamuti)	HEI	P	1	1	1	1	
14		Expert 13 (Patson)	HEI/Pract	Pvt	1	1	1	1	
15		ZCASU (Sikalumbi)	HEI	P					
16		ACU (Kayumba)		Pvt					
17		Mulungushi University (Simfukwe)		P	1	1	1	1	
18		CBU (Mutambo)	HEI	P	1	1	1	1	
19		UNZA (Kakana)	HEI	P					
20		ZICTA (Exp 12:Chintu)	Gov.	Gov.					
21		ARU (Belemu)	HEI	Pvt.					
22		Mukuba University (Luchembe)	HEI	P	1	1	1	1	
23		CBU (Shumba)	HEI	P					
24		NU (Kings)	HEI	Pvt	1	1	1	1	

Source: Research Data (2025)

This study highlights the following key findings:

1. Consistent with the literature review, several attempts at digital system project system implementation

often will have to be made. Despite meticulously planning, with everything done right first time, it may, at times, be necessary to redo. Expert informants repeatedly stated this.

2. The probability of several false starts exists. Failure is normal, though frustrating. It is a growth curve for everyone. No system set up is foolproof, it inevitably experiences problems, hence the need to be well tried, soundly tested with ongoing fixing of bugs until ready for use. Even then, trouble shooting and glitches still periodically show up though progressively less frequently with time and experience.

3. Study participants stated that a Pilot phase was necessary while setting up the national digital system. An initial small manageable sample composed of a few HEIs is proposed, preferably in the urban setting. According to informants, this pilot equally demands a competent team to coordinate, navigate, install, evaluate and fix, check and resolve bugs, get feedback and refine the system etc.

4. At least three main system option views emerged during data collection on which option was best to pursue in setting up the integrated system. The first favored an exclusively Zambian owned installation was an integrated, all-inclusive centralized system (as originally proposed by this study). 52% vouched for this path. Figure 4 shows what was found:

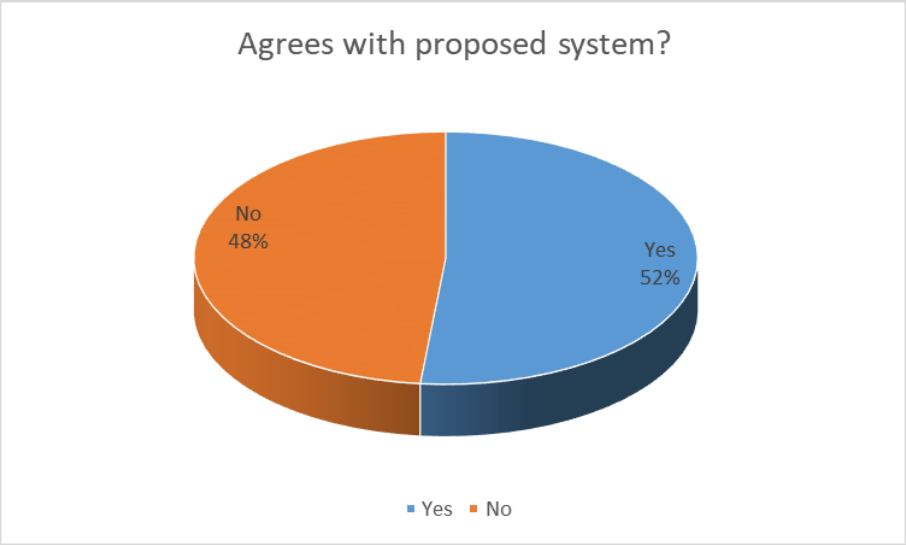

Figure 4: type of digital educational system supported by informants
Source: Research Data (2025)

The second was exploiting the already existing successful ZAMREN model but scale it up. The model exclusively rested on cloud computing with shared network resources and clients not necessarily locally owning any digital infrastructure but leveraging cost effective, perceived sustainable options. 48% vouched for this route. The third option was a combination of the first two. This system ensures the nation owns the digital infrastructure but equally leverages cloud-based options buttressed by local servers (probably housed at the national data centre). This allows for flexibility, diversity, local data control and independence from foreign client server providers.

5. No national or comprehensive all-embracing educational digital system was found existing in Zambia at study time. Multiple and diverse independent institutionally owned systems existed in the context though.

6. Informants asserted that stakeholder engagement (including government) was critical to project success. A majority of respondents (61%) stated that engagement from inception was critical. However, some respondents expressed reservations over government led initiatives [1] and stated it thus: "*I would…recommend that private sector using cloud computing and internet service providers to take the lead instead of government. Maintenance of such systems by government is not sustainable*". Figure 5 shows what was found:

[1] Although they though government was essential in creating an enabling environment for initiatives to thrive.

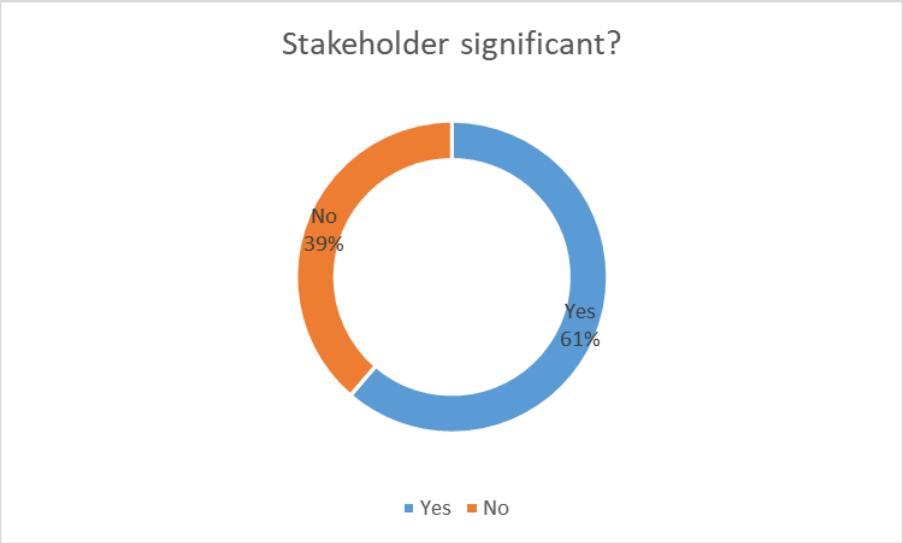

Figure 5: Informant perception of stakeholder significance
Source: Research Data (2025)

7. Finally, the study found that this proposed digital framework can systematically be scaled up and out. From pilot phase, it can then be cascaded to the rest of the country. Once successful, the story can be shared to the rest of the world as Kunda and Khunga (2021) have done on ZAMREN.

We transition to discuss the implications of the findings could be.

Discussion

Arising from the findings, analysis and scrutiny follows before final report generation. This section discusses the meaning and implications of the findings. The findings indicate that an educational backbone system is an urgent priority for Zambia though generally, it may be said that the following key points also result: 1. Desired efficiencies 2. Excluded population are provided for 3. The Digital Divide is narrowed and, 4. Changed dynamics are recognized for appropriate remedial action. If the system is not installed this may result in delayed eLearning growth in Zambia, country lagging behind and continue the more expensive practice of doing business. Second, it must be recognized that initial (and even repeated) failure is normal. This is consistent with what Tedre et al. (2010) found in the Tanzania experience. While mitigated and still not successful first time, it should not break implementer's fortitude. Additionally, this suggests the need for patience, resilience, on-going investment, timeliness, collaboration, consultations, integrated multi-sectoral/disciplinary teams, team cohesion, M & E, commitment to the project and also how best to set up the project. If patience and correct paced implementation is not allowed, it may lead to further more costly re-investments in the long term. Allowing a system to mature gives fewer problems downstream. Third, cultural shifts result from transitions from a manual to digital system. It is important to meticulously manage this process because if not well handled or installed, neglected infrastructure may result with users reverting to familiar manual or in person F2F arrangements. A digital culture helps building resilience in the face of expected glitches and challenges along the way. Fourth, a clear road map is essential. If this is unclear, it leads to erratic process with no real project endpoint. There is need to explore what needs to be done, how best this project process and direction can be made to efficiently work. Fifth, there is also need to discuss the pilot, who will be involved, how big the pilot, how much it will cost, what should be done (and by who), where to start from, and shall scaling up shall be done, among other things. If stakeholders are unclear or get surprise decisions passed without their involvement, they may frustrate or oppose even good intentions. Sixth, the process must be extremely clear from the start with stakeholders knowing their role, tasks, what they are doing, why they are part of the project and their expected contributions or where to come in, etc.

Seventh, of the three prominently emerging options for setting up (installing) the integrated system, this researcher, while applauding and according due regard for already existing (and successful) models prefers the third all-inclusive option for the following reasons: a. Contextual dynamics have changed (e.g., cheaper and more flexible options exist). b. Inclusivity and more equitable access in sync with the SDG 2030[1] and Agenda

[1] Refer to 'Transforming our world: The 2030 Agenda for Sustainable Development' by the United Nations. The document highlights several priority areas and goal # 4 reads '*Ensure inclusive and equitable quality education and promote lifelong*

2063 protocols. c. The presence of stronger, faster connection and more stable Satellite technology d. Zambian owned infrastructure could be 100% controlled and managed by natives. e. The ability to harness and collate all data from across the country at the click of the button contributing to 'big data' collation for AI purposes. This eliminates costly bureaucracies, red tape and inefficient manual processes. Though this preferred option may appear initially high capital intensive, it, in the long-run may prove cost effective as the nation will both harness (collate and control) local data which in future, is cheaper given garnered economies of scale. This is guaranteed because all educational levels (thus expanding income base) through it. Further, the generated data could be commercially viable leading to sustainability. That route results in quicker return on investment (ROI). Additionally, this system will facilitate life-long learning in a global south context via TESSA[1] facilitated digital OERs (OER Africa, nd)[2]. This is in accord with SDG # 4 and way to go. Though there could be other additional reasons, these suffice. Given these reasons, the researchers finally opted for the third option gravitating away from the initially preferred 1st option as it represents the best of both worlds.
All these discussion points within this study are essential.

Conclusion

The enquiry highlights several conclusions arising from the findings.

1. The study concludes that Zambia is presently inadequately prepared and therefore not moving (pace and direction) as desired. The country does not possess all the required infrastructure or necessary human capital to set up this strategic installation. A number of elements demand enhanced capacity in the midst of fragmented but commendable efforts, though insufficient. No synergies can result from this scenario.

2. Setting up and installing a full house robust digital educational ecosystem from scratch should not be hurried despite potential budget constraints (or abundance), donor dictates/demands or time limitations, etc. Patience is essential during this massive undertaking. Even when the venture commences in earnest, things should not be rushed but momentum retained.

3. No national integrated digital educational backbone (i.e. LMS, SMS etc.) exists as at study time. This lack is concerning as may hinder eLearning growth as well as perpetuate the existing digital divide.

4. Relevant enabling and support structures are lacking. By 'structure', we are not primarily referencing digital infrastructure (although equally important) per se, but structural avenues enabling project facilitation. This point is about mandated structural offices, with full time dedicated staff daily running office business for project success. For example, if a beautiful system is installed and yet relevant support structures to run it are absent, the entire venture soon becomes a white elephant. There is need for established organizational functional structures in government and HEIs to specifically manage and run this installation.

5. Integrated national coordination is essential but lacking. Someone or some central hub must own and coordinate all authentic digital ecosystem efforts taking place in the country during the installation of this system for success. This does not mean that institutions lose their autonomy to have their own preferred local institutional systems but rather, the backbone to which all other systems periodically plug in and out must be centrally managed. Both HEA and one expert preferred this approach when they opined in series: "*eLearning should be managed by individual learning institutions and regulators like HEA or TEVETA should set quality standards and monitor quality*." The other similarly opined: "*…this [eLearning] should be managed by HEIs themselves in coordination with regulatory bodies such as HEA.*" Historically, the efforts in Zambia have been fragmented lacking a central coordinating hub for industry players to prioritize working together rather than in silos. Significant private and public funds are daily invested into well-intentioned projects, but wasteful duplications rather than synergies result. Sichone (2023) found that there was no mandated national leadership structure and actors (or industry players) operated in silos therefore not realizing desired results or impact.

6. Champions are essential to moving any agenda. Such persons are passionate about and offer the needed push and leadership towards achieving a desired goal. However, champions were lacking in the context.

7. Consistent and steady guaranteed funding lack was identified as one of the limiting factors hampering prompt and efficient project execution. This is critical to any project success.

learning opportunities for all'

[1] The acronym *TESSA* stands for T=Teacher, E=Education, S=Sub, S=Saharan, A=Africa

[2] Accessible at www.oerafrica.org

8. Centrally organized and administered digital educational database system is lacking. While it is ideal to mitigate the yawning digital divide to expanding reach and access and allowing for diversity, Zambia needs to this own strategic installation that it can 100% control or leverage for AI development and training purposes.

9. Finally, more than one option for system implementation exist, Design and purpose for each system varies and determines choice. Prior meticulous background research, consultation, reflection and planning is essential.

We conclude that Zambia requires a strategic, layered, organized, organically connected systematically coordinated effort ensuring that the best outcomes of what is intended collectively from all stakeholders.

Recommendations

For this venture to succeed, recommendations advanced are for urgent attention if various specific stakeholders. Below are some of them as summarized in Table 3.

Table 3: Summary of Study Recommendations

Issue	**Responsible**
Undertake assessment & design (for project)	Stakeholders
Invest in state of the art digital infrastructure	Government, HEI
Generate Specific policy and guide lines (TOR)	Government, HEI, HEA, ZAQA
Train and sensitize Team, stake holders	HEIs, NGOs etc.
Pilot (Team of experts, selected HEIs)	HEIs, Government
Clear time line/Implementation schedule	Government
Set up/install/upscale or upgrade Central data/information repository & Hub (e.g. tier 3 National Data Centre)	Government, ZAMREN, ZICTA
Install organic but permanent structures to facilitate implementation and management of project (e.g. offices from national to district level with dedicated staff) supported by stable funding for operations, repair and maintenance.	Government, HEIs
Install an integrated national eLearning backbone system allowing for flexibility, independence, automatic syncing and variety (a wide variety of diverse institutional systems) but the system must be compatible to a wide range of systems and able to collate data, scale up, sort, perform analytics, track progress, integrate, query data and AI powered.	Government, HEI
Conduct national quantitative study to ascertain inputs, cost etc. for the entire project	Government and stakeholders e.g. Commonwealth of Learning
Future research: Explore 'game changer' emerging issues (e.g. Artificial Intelligence-AI) & develop contextually relevant edtech	NGOs, Researchers, HEIs, government

Source: Research Data (2025)

From Table 3, it is clear that Zambia lacks and needs to urgently invest in state of the art digital infrastructure. Government and HEIs must invest in relevant infrastructure to support and run this proposed venture. An integrated national eLearning backbone structure beyond existing ZAMREN, optic fibre, etc.) connected to the National Data Center is essential. Government must lead this initiative. Tedre et al. (2010: 11) observed that the absence of a national internet backbone hindered eLearning growth in Tanzania.

Second, structure to support and sustain this venture post launch needs to be in place. This structure should include dedicated paid full time project staff responsible to government and respective stakeholders. Government and HEIs must make this happen sooner rather than later. A study by Sichone (2023) found that this gap existed (at HEA, govt., HEIs etc.; Chifwepa, interview, Lusaka, December 2022) and needed to be addressed to maximize on data generated within the country enabling data availability at the click of a button. This also aids AI development efforts (Bolon-Canedo & Moran-Fernandez, 2023; Couch, 2022; Azaroual, 2024).

Third, there is need for specific policy by government compelling all stakeholders in the HEI ecosystem to ensure that they periodically logged in, synced and tapped into this backbone thereby contributing strategic data. Interested and mandated parties can then track, collect, collate, sort, and analyze all this data. Here we have in mind BETUZ, SESTUZ, TCZ, HPC, ECZ, ZIALE, HEIs, HEA, ZAQA etc., and all other relevant primary and secondary stakeholders. Presently, data collection processes are largely manual, isolated, cumbersome, inefficient and costly. All this can change once this digital installation succeeds.

Fourth, there is need to mobilize, train a cohort as well as assemble a project coordinating implementation team for the down-stream training of all other stakeholders. It is essential to involve stakeholders from inception and ensure ongoing sensitization throughout. This team is to devote itself to the setting up this system. The said project team may constitute of several key stakeholders including Government, HEIs, NGOs, researchers, practitioners and distinguished field experts within the country with vast international and local exposure (experience). It is critical to have that correctly handled from the start. Table 4 suggests a proposed team of experts that could be included in an ideal implementation task force/team. The names of included individuals are only proposed:

Table 4: Suggested team members

Suggested expert	Area of expertise/Skill	Credential (Minimum)	Contact details
	ICT for Education/Systems development/Pedagogy (Educational Technologist/User interface and experience designer)	PhD	
	Cyber security	PhD/FICTAZ	
	System Administration	MBA/MSc/MIT	
	Programming	MIT	
	Networking	PhD/DIT	
	Pedagogy/Curriculum dev for eLearning (Content Developer) -Government & Commonwealth of Learning	BA	
	Policy, Content Creator (Govt/Pvt)	MA/MEd/MBA	
	ICT for Education/Systems development/HEI management/Engineering (Data Analyst) Pvt HEI P HEI	PhD	
	Systems Admin (Quality Assurance Engineer) Quasi P HEI	PhD	
	Networking (Cyber Security Expert; Quality Assurance Engineer) P HEI	PhD (CS)	
	HEI Leadership/Curriculum/ODL (Content Creator) Pvt HEI	PhD	
	Data analyst	MIT	
ZAMREN	ISP (Research &…)		
MTN	ISP		
Zamtel	ISP		

Airtel	ISP		
Simplilearn	Content Creator		
	Project/Programme Manager M & E (Project Manager 1-admin/Ed) (Project Manager 2-Technical)	PhD/MBA/MSc PhD (CS)	
	Inspector 1 (govt)	MA	
	Inspector 2 (pvt)	MIT	
	Marketing expert/PR/Spokesperson	CIM	
	Finance Director	FCCA/FCMA/FFA	
	HR Director	MA (HR)/FHRMZ	

Source: Research Data (2023). (Amended 2025)

Fifth, the project must be strategically and systematically implemented in phases with an initial pilot period. This pilot is an essential component for microcosmic testing and refinement before eventually rolling out. User Access Testing (UAT) is helpful identifying bugs and fixing them during this critical phase. Implementers must never be in a hurry to execute but aim at progressively cascading and methodically scaling up (and out) to achieve the best ends. Starting from a small sample of a few test sites, allow for trial runs to enable sorting out all emerging menacing glitches and bugs. Once successful, next is roll out to the rest of the country, in a carefully calculated strategic manner. This stakeholder cohort includes HEIs, NGOs, advocacy teams led by government. All these are party to the system setting up and implementation but lessons can be drawn from successful local models. An example will do. ZAMREN[1] was initially composed of three public universities to the exclusion of others (for good reasons of course) but that inadvertently could possibly explain initial reluctance of some parties joining or leaving it. Since they were are not involved from inception, they have not owned it. CABU once joined ZAMREN but left at some point with no feeling of obligation. In CABU's perception, ZAMREN was one of the many ISPs, if not more.

In the sixth place, a tangible clear realistic timeline, path, structure and road map is essential from the outset. This is non-negotiable because it provides framework, clear boundaries, targets or benchmarks in addition to direction. This project must not be left open-ended. In as much as it was earlier asserted that the project must not be rushed, it is equally important to ensure that it has a definite but flexible timeframe in which to unfold, consistent with good (best) project management practice (Heagney, 2012). Ideally, this stakeholder-agreed timeframe has all connected parties speaking into it for order, transparency and tracking. All things being equal, the government must lead all these initiatives for obvious reasons: they own the big picture agenda for national human capital needs and development. Sichone (2023), in his study found that the majority felt a 3-5 year timeframe was sufficient to pull this off. If, for any reason, the project was to be rushed and all resources available, 1-3 years was deemed roughly sufficient though not recommended. A longer timeframe allows for sound qualitative testing, scaling up, glitches and bugs fixing or even progressive upgrades. Unbound project timeframe proves counter-productive and expensive in the long run. Figure 4 and Table 7 present a possible schedule, path and proposed timeline.

[1] The two prime Pioneers of this venture were Mr. Mwala Sheba (CBU) and Professor Jameson Mbale (UNZA & CBU). These men generated the original successful proposal of what became ZAMREN and were later honoured for their contribution to Zambia.

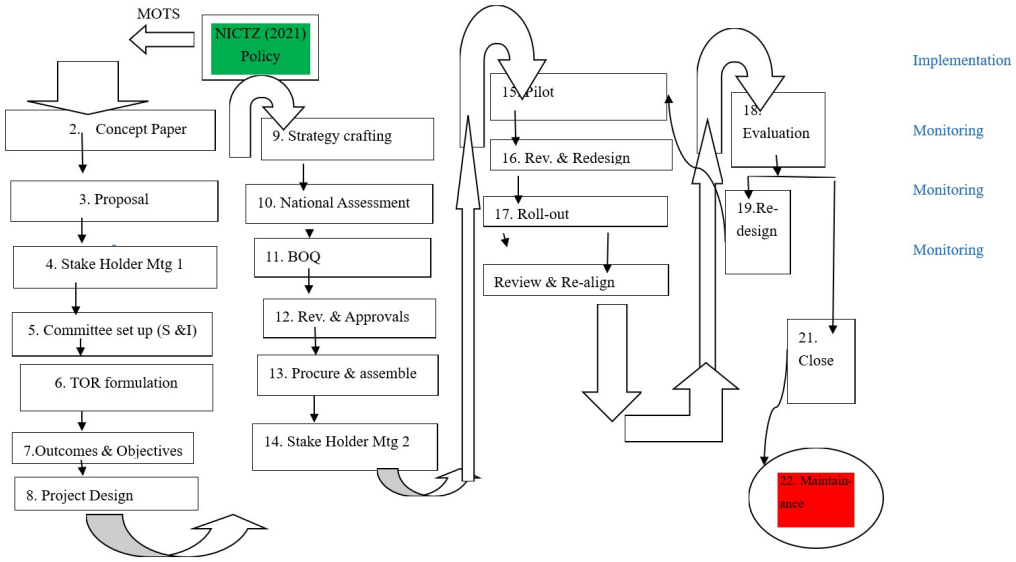

Figure 4: Proposed Project implementation road map (concept) for eLearning in Zambia

Source: Research Data (2023)

Table 7: Suggested implementation (x years) time frame

Step # on model	Activity code/#	Activity	Duration	Person responsible
1	1.1	Review of National ICT policies	1 month/3months	Consultant/ Project Manager
2 3	1.2 1.3	Concept generat Proposal genera	2 weeks 1 month	Consultant/Project Manager
4 5	1.4 1.5	Stakeholder (I) Committee set	Two days Two days	Project Mgr
6 7 8 9	1.6 1.7 1.8 1.9	TOR drawn Obj & outcome Strategy Design (I)	1 week 2 weeks 2 weeks 2 months	Committee
10	1.10	Assessment & Design (II)	4 months	Committee
11	1.11	BOQ	2	Committee
12	1.12	Stakeholder review and approval (II)	1 week	Project Mgr/Committee
13	1.13	Procurement & system building	6 months	Committee
14	1.14	Stakeholder briefing (III)	1 week	Project Mgr/Committee
		Implementation (I)		Committee
15	1.15	Pilot	3 months	Committee
16	1.16	Review and re-design	3 months	Technical team/Educational specialists
17	1.17	Phased roll-out	1 year	Technical and educational experts/HEIs

18	1.18	Review & alignment	3 months	Technical, programmers & Educational experts
19	1.19	Evaluation	A year after full implementation	Project Mgr/Evaluator
20	1.20	Re-design/Close	Contingent on (19) above	Project Mgr/Committee
21	1.21	Maintenance	On-going	Project Mgr

Source: Research Data (2023)

Seven, there should be a central hub earlier referenced (Refer to: Conclusion #7) to garner, store and secure all locally generated data in the Zambian context. It should be noted that Zambia as a country daily generates significant amounts of valuable data that is wastefully left in the hands of foreign cloud server owners, mostly offshore (Sichone, 2023). What they do with accumulated data is a discussion of another study. That said, all this strategically sensitive data should be domiciled in country and stored on the local server housed at the National Data centre.

Eighth, a robust, relevant, tracking and versatile monitoring tracking system should be in place, as earlier referenced (i.e. National Data centre). Collated data and information should enable planners and decision makers to, at a click of the button, know who is studying what, from where, grades or areas needing attention via the integrated system. Thus, decisions could be made based on this generated data drawn from the system. Clearly, all this data aids planning, predicting (predictive analytics), trend analysis, designing, curriculum review, AI (big data), potential novel research areas or simply refining of existing systems. It is worth mentioning that currently, the basic foundational structure elements are already in place to support points here recommended but far much more still needs to be done to foster the education agenda in Zambia. Sadly, most of these digital elements presently are scattered and not integrated.

Ninth: There is need to tap into ZAMREN to backstop and scaffold the proposed national eLearning backbone (Kunda & Khunga, 2021). This would result in a win-win scenario and build desired synergies. For instance, ZAMREN could concentrate on HEIs while the rest of educational institutions are catered for by the integrated system. In the process, collaboration around strategic data syncing and collation could go on. Ideally, these systems (i.e. ZAMREN & proposed installation) should be integrated into one because separate disjoint independent systems cannot efficiently achieve the synergistically proposed outcomes.

Tenth, GRZ is encouraged to create 'centres of excellence' from where others can learn from (AU 2022:10).

Eleventh, raise, recognize and support local champions.

Twelfth, Design and develop detailed system flowcharts and implementation plan (Omwenga et al., 2004).

Thirteenth: Sustainability: A nominal annual subscription (token) fee could be charged so that the system operates 24/7. Various pricing and paying models/structures could be used.

Future Research

In wrapping up the recommendations, a few areas of future research are proposed.

1. Researchers, government etc., should ensure this proposed area (i.e. in this study) is explored further and deeper undergirded by published empirical peer reviewed papers as outcomes. This should address the limited local contextual sources. As noted, little has, to-date, been published about eLearning in general and systems in particular in Zambia though globally, a lot is occurring, tracked and published. There is still room to investigate other relevant but connected areas. Kunda and Khunga (2021), among others have touched on this subject though focused on ZAMREN, pooling resources, expanding internet access and dropping costs via shared networks.

2. Government and stakeholders need to continue the exploration and research into a robust, contextual secure backbone system as Dr. Kachaka (interview, Lusaka, 2023) opined. Here, the emphasis is not only a mere system, but a secure, robust, easily accessible system not susceptible to data breaches, abuse or integrity compromises.

3. In future, there is need to research, track, proactively determine, and identify emerging trends in the Zambian education sector, available options, better and more efficient progressive contextual systems, among other needs. Evidently, there is need for a lot of research in several emerging or evolving spheres. A dedicated Think Tank would be ideal. The challenge is upon government, stakeholders, individual researchers, institutions, and projects. If left to chance, no meaningful progress is likely, and may settle for the lagging status quo. However, current dynamics forbid this. On-going research and development with attendant funding should be assured and guaranteed. Although we might have some knowledge that same knowledge could probably be outdated, unfit for meaningful strategic use into the 'shifting target' future.

4. Future research should focus on AI and how best to leverage it for promoting the proposed virtual learning system including life-long leveraging which syncs with SDG # 4. Further, the US Department of Education (2023) report encourages research, consultation and leveraging of AI for productive progressive purposes.

Limitations of Study

This study highlights a few limitations that could have impacted on the enquiry:

First, the initial sample was limited (18). This is connected to the study nature, qualitative. Naturally, the sample was not expected to be large. Nonetheless, in an ideal scenario, the sample should be large enough to allow for saturation. Once saturation is reached, researchers become comfortable that all bases have been covered. Saturation level was reached but could have been stronger with a larger sample. That was a possible limitation in itself.

Secondly, only a limited amount of local contextual data sources were available, both at primary or secondary level. The sources that researchers accessed and relied on were a limited sample, particularly in the case of Zambia. Chembe, et al. (2024), Kunda and Khunga (2021) and relatively few others have published on this subject. Chembe et al. (2024), in particular, wrote on AI and education, impacting us today while Kunda and Khunga (2021) narrated how to set up a shared network for internet access among HEIs and highlighted necessary key success factors for NRENs in land locked countries. Omwenga et al. (2004) is the next closest from within the African context. The Kenya context is not very different from Zambia. These limitations could have impacted this study and results affected.

Third, data collection approaches could have limited clarity of responses. WhatsApp, phone call, email and in person interviews were used with each of these methods having limitations. For instance, some preferred WhatsApp over email or phone call worked better for them. Others felt they needed much time before responding in writing but once clarified, most swiftly responded. Still others were willing to respond but too busy with other responsibilities and eventually when they did respond, feedback was evidently done in a hurry. All these constituted some form of limitation.

Fourth, the data collection period was limited from March 14-31st 2025. As a result, some informants were excluded and dubbed 'non-responsive' though their voice would have added value if they fed back.

The need for an integrated all-inclusive flexible eLearning system is clear though the modalities may differ. The proposal advanced in this paper is a potential solution towards making education universally accessible to all Zambians, in sync with SDG 2030 # 4. The choice remains collectively in our court. The earlier action is taken, the better for posterity.

References

Abera, M., Byungura, J.C., Ndikumana, R., Abebe, S.M., Bimenyimana, P.C., Gizaw, R., and Jemal, M.W. (2023). 'Implementing e-Learning in Low Resourced University Settings: Institutional Experiences and Perspectives at the University of Gondar (UoG) and University of Rwanda (UR)', *Mastercard Foundation e-Learning Initiative Working Paper Series* 1.0: 1-52, Available at: https://education.asu.edu/sites/default/files/2024-02/02-12-2024_J11-WP_%20Implementing_e-learning_in_low-resourced_university_settings_PWFormatted.pdf, Accessed on 27th December, 2024.

Association of African Universities (AAU, nd). 'Riding the National Research and Educational Networking Train in Africa', Available at: https://www.aau.org/wp-content/uploads/sites/9/2018/05/Riding-the-National-Research-and-Education-Networking-Train-in-Africa.pdf, Accessed on 30th December, 2024.

African Union (2022). 'Digital Education Strategy and implementation Plan', Available at: https://au.int/sites/default/files/documents/42416-doc-1._DES_EN_-_2022_09_14.pdf, Accessed on 30th December, 2024.

African Union (2015). 'Agenda 2063: The Africa we want' (popular version), available at: https://au.int/sites/default/files/documents/36204-doc-agenda2063_popular_version_en.pdf, Accessed on 26th July, 2024.

AFROHUN (2023). 'Building E-Learning Capacity in Cameroonian Universities: Opportunities and Benefits', available at: https://afrohun.org/wp-content/uploads/2023/04/Cameroon-E-Learning_Final.pdf, accessed on 30th December, 2024.

Ansong, E., Boateng, R., and Anderson, A.B. (2017). 'The nature of E-learning adoption by stakeholders of a University in Africa', *e-learning and digital media*, available at: https://journals.sagepub.com/doi/full/10.1177/2042753017731235, accessed on 30th December, 2024.

Azaroual, F. (2024). 'Artificial Intelligence in Africa: Challenges and Opportunities', Policy Brief (May).

Barajas, M. (2002). 'Restructuring Higher Education Institutions in Europe: The Case of Virtual Learning Environments', *Interactive Educational Media* # 5 pp.1-28. Available at: https://dialnet.unirioja.es/descarga/articulo/4544729.pdf, Accessed on 3rd October, 2022.

Barasa, P.L. (2021). *Digitization in teaching and Education in Kenya: Digitization, the future of work and the teaching profession project*, Geneva: International Labour Organization (online). Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_783665.pdf, Accessed on 12th July, 2022.

Berg, B.L. (2009). *Qualitative Research Methods: For The Social Sciences* 7*e*, Pearson Education.

Bolon-Canedo, V., and Moran-Fernandez. (2023). 'Artificial Intelligence: Past, Present and Future, *RACSG*, Volume 112 #1:28-39.

Couch, J.R. (2022). 'Artificial Intelligence: Past, Present and Future', *Journal of the South Carolina Academy of Science,* Volume 21 #1: 1-4.

Chembe, C., Nasilele, N.B., and Msendo, R. (2023). 'The Fuss about Artificial Intelligenec in Education: Should we worry?' Zambia Information Communication Technology (ICT) Journal, Volume 7, # 2: 30-35, Available at: accessed on: 27th December, 2024.

Choudhury, H., and Das, T.K. (2020). 'Development of an e-learning system for open and distance learning mode of education system: A North-East Indian perspective', *IJM*, Volume 11, # 9: 1737-1751, available at: https://iaeme.com/MasterAdmin/Journal_uploads/IJM/VOLUME_11_ISSUE_9/IJM_11_09_166.pdf, Accessed on 30th December, 2024.

Creswell, J.W. (2012). *Educational Research*, 4e, Pearson. Available at: https://www.pdfdrive.com/educational-research-planning-conducting-and-evaluating-d16448388.html, Accessed on 3rd October, 2022.

Gamede, T, B., Ajani, O.A.., and Afolabi, S.O. (2022). 'Exploring the Adoption and Usage of Learning Management System as Alternative for Curriculum Delivery in South African Higher Education Institutions During Covid-19 Lockdown', *International Journal of Higher Education*, Volume 11, # 1: 71-84. Available at: https://files.eric.ed.gov/fulltext/EJ1340611.pdf, Accessed on 27th December, 2024.

Gunga, O.S., and Ricketts, W.I. (2007). "Facing the Challenges of e-learning initiatives in African Universities," *British Journal of Educational Technology*, Volume 38 # 5, pp 896-906. Available at: http://ir.mksu.ac.ke/handle/123456780/4702, Accessed on 1st September, 2022.

Hali Access Network. (nd). 'Education Fact Sheet-Zambia', Available at: Accessed on 7th March, 2025.

Heagney, J. (2012). *Fundamentals of Project Management*, 4e, AMACOM

Haleem, A., Javaid, M., Qadri, M.A., and Suman, R.(2022). 'Understanding the Role of Digital Technologies in Education: A review', *Sustainable Operations and Computers* (*Elsevier*), Volume 3: 275-285, Available at: https://www.sciencedirect.com/science/article/pii/S2666412722000137, Accessed on 27th December, 2024.

Kahiigi, E.K., Ekenberg, L., Hawson, H., and Danielson, M. (2008). 'Explorative study of E-earning in Developing countries: A case of Uganda Education system', *IADIS* (international Conference on eLearning): 195-199, Available at: https://www.researchgate.net/publication/220969452_Explorative_Study_Of_E-Learning_In_Developing_Countries_A_Case_Of_The_Uganda_Education_System, Accessed on 30th December, 2024.

Kapepe, N (nd). 'The impact of Information Communication Technology in Edication: The Benefits and Challenges teachers face in Public secondary school in Monze District' Thesis, Cavendish University, Available at: Accessed on 18th September, 2023.

Kaumba, M., Mphahlele, RS., Muleya, G., and Simui, F (2021). 'Disablers and enablers in the uptake of ICTs in Rural primary Schools of Mwinilunga District, Zambia', *Journal of Education Technology and Online learning* Volume 4 # 1, Available at: https://files.eric.ed.gov/fulltext/EJ1286746.pdf, Accessed on 29th September, 2022.

Kayange, AKMY (2019). 'E-Learning Encounters in Malawi Higher Education Institutions', *International Journal for e-Learning Security*, Volume 8 # 1 (March), Available at: https://infonomics-society.org/wp-content/uploads/E-learning-Encounters-in-Malawi-Higher-Education-Institutions.pdf, Accessed on 3rd July, 2021.

Kayombo, KM., and Mwiinga, B (2021). 'Acceptability and Challenges of Online Higher Education In the Covid-19 Era in Zambia', *Academicia*, Volume 11 # 2 (February), Available at: http://dspace.zcas.edu.zm/handle/123456789/96, Accessed on 19th August, 2022.

Kearsley G (2010). 'Andragogy (M. Knowles). The Theory into practice data base', Available at: https://locavore.guide/sites/default/files/resources/files/The%20Adult%20Learning%20Theory%20-%20Andragogy%20-%20of%20Malcolm%20Knowles%20-%20eLearning%20Industry.pdf, Accessed on 16th April, 2021.

Konayuma, G.S., Shemi, A.P., and Chiinza, T. (2023). 'Teaching and the teaching Profession in a digital world-Zambia: Background Paper', ILO/GIZ. Accessed on 4th April, 2024, Available at: https://www.ilo.org/media/364116/download.

Kunda, D., and Khunga, B. (2021). 'Implementing National Research and Education Networks (NRENs) in landlocked African Countries: Critical success factors', Available at: https://casefornrens.org/wp-content/uploads/2021/05/Implementing-NRENs-In-Landlocked-African-Countries.pdf, accessed on 30th December, 2024.

Lodhia, R. (2006). 'Annotated Bibliography on e-Learning and Application of Educational Technology in African Countries, or in Contexts relevant to Africa', Carnegie Corporation (New York), Available at: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=fa050613638308641c359ef38c5edf00b680d9b7, Accessed on 27th December, 2024.

Macra, M.G. (2021). 'Unlocking digital connectivity in Africa', European Investment Bank, available at: https://www.eib.org/attachments/publications/unlocking_digital_connectivity_in_africa_en.pdf, Accessed on 30th December, 2024.

Madimabe, M.P., and Omodan, B.I. (2021). 'Investigating the effects of E-Learning as a Method of Curriculum Dissemination for Rural TVET College Students', *ressat*, Volume 6, # 3: 82-92, Available at: https://files.eric.ed.gov/fulltext/EJ1334852.pdf, Accessed on 27th December, 2024.

Ministry of Higher Education. (2019). 'National Higher Education policy', GRZ, Available at: https://hea.org.zm/wp-content/uploads/2021/08/NATIONAL-HIGHER-EDUCATION-POLICY.pdf, Accessed on 28th March, 2025.

Ministry of Technology and Science (2023) 'National ICT Policy', GRZ, available at:

https://www.mots.gov.zm/wp-content/uploads/2023/10/National-ICT-Policy-2023.pdf, accessed on 28th March, 2025.

Ministry of Technology and Science (nd). 'Open and Distance Flexible Learning Strategy: 2024-2028', GRZ, available at: https://www.mots.gov.zm/wp-content/uploads/2023/12/ODFL-IMPLEMENT-STRATEGY-.pdf, Accessed on 28th March, 2025.

Ministry of Technology and Science (nd). 'National Digital Transformation Strategy: 2023-2027' GRZ, available at: https://www.mots.gov.zm/wp-content/uploads/2023/10/National-Digital-Transformation-Strategy.pdf, accessed on 28th March, 2025.

Mujawar, R.Y., and Mujawar, A.R. (2021). 'E-Learning platform: A back bone for students learning', IJIMF, volume 7, # 7: July:90-94, Available at: https://www.researchgate.net/publication/362519284_E-learning_Platform_A_backbone_for_Students_learning, Accessed on 30th December, 2024.

Mukosa, F., and Mweemba, B (2019). 'The Digital Divide Hindering E-learning in Zambia', *International Journal of Scientific Research and Engineering Development* Volume 2 # 3 (May-June) pp. 860-865. Available at: https://www.researchgate.net/publication/334318597_The_Digital_Divide_Hindering_E-learning_in_Zambia-, Accessed on 28th June, 2021.

Namaiko, P. (2020). 'An assessment of implementation of Information Communication Technology (ICT) policy in selected secondary public schools in Lusaka District', Thesis Cavendish University, Accessed on 18th September, 2023, available at:

OER Africa (nd). 'Teacher Education in Sub-Saharan Africa: Case studies on African OER initiatives in Higher Education', Available at: https://www.oerafrica.org/system/files/2024-01/teacher-education-sub-saharan-africa.pdf, Accessed on 25th November, 2024.

Omwenga, E., Waema, T.M. and Wagacha, W.P. (2004). 'A Model for Introducing and implementing E-Learning for Delivery of Educational content within the African Context', *African Journal of Science and Technology (AJST) Science and Engineering Series*, Volume 5 # 1: 35-48. Available at: https://www.researchgate.net/publication/309426242_A_model_for_introducing_and_implementing_e-learning_for_delivery_of_educational_content_within_the_African_context, Accessed on 27th December, 2024.

Patton, MQ (2002). *Qualitative Research & Evaluation Methods*, London: Sage Publications.

Siaciwena, R., and Lubinda, F. (2008). 'The Role of Open and Distance Learning in the implementation of Right to Education in Zambia', *IRRODL*, Volume 9 # 1: 1-12, Available at: https://www.irrodl.org/index.php/irrodl/article/view/481/995, Accessed on 22nd November, 2024.

Sichone, B.C. (2023). 'Assessing status of eLearning readiness among 20 HEIs in Zambia', ARU Unpublished PhD Thesis.

Stoltenkamp, J., and Kasuto, OA (2009). 'E-Learning Change Management and Commission Strategies within a HEI in a developing Country: Institutional Organizational Cultural Change at the University of Western Cape', *Education and Information Technologies* Volume 16: pp. 41-54. Available at: http://repository.uwc.ac.za/xmlui/bitstream/handle/10566/1076/Stoltenkamp_E-learning-change_2011.pdf?sequence=3&isAllowed=y, Accessed on 03 July, 2021.

Suhail, A.N., and Mugisa, E.K. (2007). 'Implementation of E-Learning in Higher Education Institutions in Low Bandwidth Environment: A blended Learning Approach', Fountain Publishers, Makerere University, Kampala, 302-322. Available at: https://makir.mak.ac.ug/handle/10570/1888?show=full, Accessed on 3rd July, 2021.

Tedre, M., Ngumbuke, F., and Kemppainen, J. (2010). 'Infrastructure, Human Capacity, and High Hopes: A decade of Development of e-Learning in a Tanzanian HEI', *RUSC* Volume 7 no. 1; 1-20, available at: https://www.redalyc.org/pdf/780/Resumenes/Resumen_78012953009_1.pdf, accessed on 30th December, 2024.

The World Bank (2020). 'Accelerating Digital Transformation in Zambia', GRZ. Available at: https://openknowledge.worldbank.org/server/api/core/bitstreams/3903dda3-4dd5-516e-8002-

f88ba863ab30/content, Accessed on 15th July, 2022.

Turnbull, D., Chugh, R., and Luck, J. (2021). 'Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge?' *Education and Information Technologies*, Volume 26: 6401–6419 Available at: https://www.researchgate.net/publication/352703626_Transitioning_to_E-Learning_during_the_COVID-19_pandemic_How_have_Higher_Education_Institutions_responded_to_the_challenge, accessed on 28th March, 2025.

Turnbull, D., Chugh, R. and Luck, J. (2020) Learning Management Systems: An Overview. In: Tatnall, A., Ed., *Encyclopedia of Education and Information Technologies*, Springer, Berlin, 1052-1058. https://doi.org/10.1007/978-3-030-10576-1_248

United Nations (2015). 'Transforming our World: The Agenda for Sustainable Development', Available at: https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf, Accessed on 14th July, 2022.

United States Department of Education (2024). 'A call to Action for closing the Digital Access, Design, and use Divides'. Accessed on 11th April, 2024, Available at: https://portal.ct.gov/das/-/media/das/ctedtech/publications/2025/2025-used-oet-archive/netp24.pdf.

United States Department of Education. (2023). 'Artificial Intelligence and future of Teaching and Learning: Insights and Recommendations', Washington, DC. Available at: Accessed on 11th March, 2025.

Valverde-Berrococco, J., Garrido-Arroyo, M.D. C., Burgos-Videla, C., and Morales-Cevallos, M. B. (2020). 'Trends in Educational Research about e-Learning: A Systematic Literature Review (2009-2018)', *Sustainability/MDPI*, accessed on 27th December, 2024, available at: https://www.mdpi.com/2071-1050/12/12/5153.

World Vision International (2009). 'LEAP hand book', 2e, available at https://www.wvi.org/sites/default/files/LEAP_2nd_Edition_0.pdf, accessed on 28th March, 2025.

Bio

Dr. Billy C Sichone serves as Deputy Vice Chancellor for Research and Graduate studies at Central Africa Baptist University. He holds several doctorates including a PhD in Online Education and has been in Academia for over a decade after a near two decade experience in the Development Industry. He is also author of several books and paper on Research, Apologetics and Business.