E-learning platforms for agricultural innovation management and facilitation in Africa

Mapping of RUFORUM member universities' e-learning platforms | June 2025

Author| Martin Boton

DeSIRA LIFT

RUFORUM Capacity Building in Agriculture

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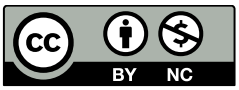

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E-Learning Platforms for Agricultural Innovation Management and Facilitation in Africa

Scoping Study Report

Author: Martin Boton

June 2025

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Executive Summary

This study, which was commissioned by the DeSIRA-LIFT initiative and RUFORUM, explores the quality and potential of e-learning platforms across African universities in supporting Agricultural Innovation Management and Facilitation (AIMF). It aims to map existing platforms among RUFORUM member institutions, assess their readiness, and explore collaborative opportunities for developing AIMF-related digital content on a regional scale.

Of the 170 RUFORUM member universities reviewed, 136 were identified as having functional Learning Management Systems (LMS), with Moodle the most widely used. Four universities, namely Bamenda (Cameroon), Kabale (Uganda), Nkumba (Uganda), and Port Harcourt (Nigeria), were selected as case studies for deeper assessment. Each represents a distinct typology of e-learning adoption: policy-driven, crisis-driven, demand-driven, and technology-driven.

The platforms were assessed using a structured quality framework that examined accessibility, usability, and security/privacy. This analysis revealed that each platform brings unique strengths that, when combined, offer complementary value for the development of a regional AIMF course. For instance, Kabale and Nkumba Universities demonstrate strong practices in user-friendly design and accessibility. Bamenda provides expertise in policy-aligned platform development. While Port Harcourt offers insights into vocational-focused learning. Together, these contributions can support the creation of a robust, inclusive, and scalable digital learning model.

While AIMF-specific content is still limited, Kabale University has started to develop three relevant course units: Agricultural Extension Practical Skills, Participatory Approaches in Extension, and Extension Methods and Tools. This serves as a practical starting point for broader regional collaboration in co-designing targeted content for both traditional students and agricultural professionals.

At the same time, the study also highlights common cross-cutting challenges. These include limited ICT infrastructure in some contexts, unreliable power supply, high Internet costs, digital literacy gaps among academic staff and learners, and a need for institutional incentives to support e- learning adoption. Addressing these barriers through collective investment and policy coordination will be essential to fully realise the potential of digital learning in agricultural innovation.

Key findings:

- There is an expansion in the adoption of E-learning adoption in Africa, which is being driven by deepening crises, a demand for flexible learning, available institutional and governmental support, and technological progress.
- Of the 170 RUFORUM universities, 136 have active LMS platforms, with Moodle the most widely adopted and the most adaptable system for variable institutional needs.
- The four platforms that have been assessed offer complementary strengths, making them a strong foundation for the regional co-development of AIMF digital learning programmes.
- Two delivery models dominate: Blended learning for university students and fully online formats for professionals. Both are applicable to AIMF course delivery.
- Kabale University has already initiated AIMF-related course development, offering an entry point for collaborative content creation.
- Key systemic challenges remain, including infrastructure gaps, high connectivity costs, limited digital skills, and the need for stronger institutional support for sustainable e-learning implementation.

Résumé exécutif

Cette étude, réalisée à la demande de l'initiative DeSIRA-LIFT et du RUFORUM, explore la qualité et le potentiel des plateformes d'apprentissage en ligne dans les universités africaines pour soutenir la gestion et la facilitation de l'innovation agricole. Elle vise à recenser les plateformes existantes parmi les institutions membres du RUFORUM, à évaluer leur état de préparation et à explorer les possibilités de collaboration pour développer un contenu numérique lié à la gestion et la facilitation de l'innovation agricole à l'échelle régionale.

Sur les 170 universités membres du RUFORUM évaluées, 136 ont été identifiées comme disposant de systèmes de gestion de l'apprentissage (LMS) fonctionnels, Moodle étant le plus largement utilisé. Quatre universités, Bamenda (Cameroun), Kabale (Ouganda), Nkumba (Ouganda) et Port Harcourt (Nigeria), ont été sélectionnées comme études de cas pour une évaluation plus approfondie. Chacune d'entre elles représente une typologie distincte d'adoption du e-learning : axée sur les politiques, axée sur les crises, axée sur la demande et axée sur la technologie.

Les plateformes ont été évaluées suivant un cadre de qualité structuré qui tient compte de l'accessibilité, la facilité d'utilisation et la sécurité/la confidentialité. Cette analyse a révélé que chaque plateforme présente des atouts uniques qui, lorsqu'ils sont combinés, offrent une valeur complémentaire pour le développement d'une formation régionale sur la gestion et la facilitation de l'innovation agricole. Par exemple, les universités de Kabale et de Nkumba font preuve de pratiques solides en matière de conception conviviale et d'accessibilité. Bamenda apporte son expertise en matière de développement de plateformes alignées sur les politiques. Quant à Port Harcourt, elle offre un aperçu de l'apprentissage axé sur la formation professionnelle. Ensemble, ces contributions peuvent soutenir la création d'un modèle d'apprentissage numérique efficace, inclusif et évolutif.

Bien que le contenu spécifique à la gestion et la facilitation de l'innovation agricole soit encore limité, l'université de Kabale a initié l'élaboration de trois modules pertinents : Compétences pratiques en matière de vulgarisation agricole; Approches participatives en matière de vulgarisation; et Méthodes et outils de vulgarisation. Cela constitue un point de départ concret pour une collaboration régionale plus large visant à concevoir conjointement des contenus ciblés destinés à la fois aux étudiants traditionnels et aux professionnels de l'agriculture.

Par ailleurs, l'étude met également en évidence des défis transversaux communs. Il s'agit notamment de l'insuffisance des infrastructures en TIC dans certains contextes, de l'instabilité de l'approvisionnement en électricité, du coût élevé de l'Internet, du manque de compétences numériques chez le personnel enseignant et les apprenants, et de la nécessité de mettre en place des mesures incitatives institutionnelles pour soutenir l'adoption de l'apprentissage en ligne. Il sera essentiel de lever ces obstacles par le biais d'un investissement collectif et d'une coordination politique pour réaliser pleinement le potentiel de l'apprentissage numérique dans de domaine de l'innovation agricole.

Principales conclusions :

- L'adoption du e-learning se développe en Afrique, sous l'effet de crises accrues, d'une demande de flexibilité au regard de l'apprentissage, du soutien institutionnel et gouvernemental disponible et des progrès technologiques.
- Sur les 170 universités du RUFORUM, 136 disposent de plateformes LMS actives, Moodle étant le système le plus largement choisi et le plus adaptable aux besoins variés des institutions.

- Les quatre plateformes évaluées présentent des atouts complémentaires, ce qui en fait une base solide pour le co-développement régional des programmes d'apprentissage numérique en matière de gestion et de facilitation de l'innovation agricole.
- Deux modèles d'enseignement dominent : l'apprentissage mixte pour les étudiants universitaires et les formats entièrement numériques pour les professionnels. Les deux étant applicables aux formations en matière de gestion et de facilitation de l'innovation agricole.
- L'université de Kabale a déjà commencé à élaborer des formations liées à la gestion et la facilitation de l'innovation agricole, offrant ainsi un point d'entrée pour la création collaborative de contenus.
- Des défis systémiques majeurs subsistent, notamment des lacunes au regard des infrastructures, des coûts de connectivité élevés, des compétences numériques limitées et la nécessité d'un soutien institutionnel plus fort pour une mise en œuvre durable de l'apprentissage en ligne.

1. Introduction

The rapid advancement of Information and Communication Technologies (ICT), particularly the Internet, has driven a profound transformation in the education sector, resulting in the exponential growth of e-learning. E-learning, short for "*electronic learning*", is a form of learning that leverages ICT to facilitate both synchronous and asynchronous engagement through interactive teaching materials, virtual classrooms, and personalised learning programmes for diverse groups, including students and professionals (Tibaná-Herrera et al., 2018).

Its growing popularity stems from its accessibility, flexibility, and cost-effectiveness, enabling learners to study anytime and anywhere (Toan et al., 2021). The COVID-19 pandemic further accelerated the adoption of e-learning, as disruptions to traditional classroom-based education necessitated alternative digital learning solutions (Jelena et al., 2019; Azlan et al., 2020; Dhawan, 2020). According to a report by the Oxford College of Marketing (2021)[1], the e-learning sector grew by over 900% between 2000 and 2022, and is currently the fastest-growing market within the education sector. By 2027, online learning enrolment is anticipated to surpass 60 million users globally.

In Africa, however, numerous challenges hinder the widespread adoption of e-learning in higher education institutions. Key barriers include inadequate ICT infrastructure, unreliable electricity supply, and limited Internet connectivity (Van der Merwe et al., 2023; Unwin et al., 2018). The COVID-19 pandemic further exasperated these challenges, as universities across the continent were forced to transition to online learning with limited readiness and support (Paschal & Mkulu, 2020; Netshakhuma, 2022). For African universities, the introduction of e-learning presents an opportunity to address critical challenges, such as massification, geographical disparities, and quality assurance in teaching and learning (Nkuyubwatsi, 2016).

Despite their potential benefits, the e-learning platforms used by African universities often lack the standard functionalities necessary to provide an optimal user experience. Many institutions rely on internally developed systems that fail to meet global usability and pedagogical standards (Nkuyubwatsi, 2016). During the COVID-19 pandemic, the rapid deployment of online learning platforms exposed these deficiencies, with major obstacles including insufficient content, low digital literacy, and a lack of effective ICT deployment (Adzovie & Jibril, 2022; Djeki et al., 2023). Furthermore, there is a scarcity of e-learning content focused on Agricultural Innovation Management and Facilitation, including processes, services, policies, and impacts, despite the growing importance of agricultural innovation in addressing food security challenges across the continent (Demiryurek, 2014).

To address these gaps, DeSIRA-LIFT and RUFORUM commissioned this scoping study to assess the potential quality of existing e-learning platforms on Agricultural Innovation Management and Facilitation.

The aim of the study is to lay the groundwork to create short courses for professionals as part of lifelong learning trajectories, and to support the attainment of university credits in Master's Degree programmes on Agricultural Innovation Management and Facilitation hosted on an e-learning platform. This initiative seeks to ensure that e-learning is both academically integrated and practically relevant, enhancing its value to both students and faculty.

This review addresses the following questions:

[1] Online Education Statistics UK | E-Learning Data 2022 | Oxford College

1. Which of the RUFORUM member universities have e-learning platforms? And which of these offer AIMF-related courses or programmes?
2. What is the quality of the e-learning platforms hosted by these universities?
3. What are the key drivers behind the development of e-learning across universities?
4. What are the main challenges that undermine the effectiveness of e-learning?
5. What lessons have been learned regarding the development of e-learning platforms and content across universities?

2. Study methodology

2.1 Study objectives

The general objective of this study is to explore the potential of RUFORUM member universities' e-learning platforms in supporting students and professionals in Innovation Management and Facilitation within the agricultural sector in Africa.

Specifically, the objectives are to:

1. Map the RUFORUM member universities with e-learning platforms.
2. Develop a comprehensive framework for assessment of the quality of e-learning platforms based on platform accessibility, usability, security, and privacy.
3. Assess the quality of the e-learning platforms mapped based on the aforementioned quality framework.
4. Consolidate the 'lessons learned' from this on the use and potential of e-learning platforms.

2.2 Data collection methods and tools

Mapping of RUFORUM member universities with e-learning platforms

With the assistance of RUFORUM, 170 member universities across Africa were considered for this study, to gain an understanding of the landscape of e-learning adoption. Eleven universities with e-learning platforms were identified through a webinar organised in collaboration with RUFORUM. The webinars were attended by the schools' Deans and e-learning platform administrators. In addition to this, a total of 136 universities were identified through a web scratch as having operational e-learning platforms, and 114 of the universities were mapped with available and accessible public e-learning platform links.

E-learning platforms quality framework for assessing the quality of e-learning platforms

A '*quality e-learning platform'* is a digital environment that is designed to deliver educational content and facilitate learning experiences effectively through features that ensure accessibility, usability, security/privacy, and pedagogical support. According to Kraleva et al. (2019), Toan et al. (2021), and Timbi-Sisalima et al. (2022), such platforms are characterised by inclusiveness and user-centred design principles that enhance learner engagement, satisfaction, and retention. Key attributes include; intuitive navigation, responsiveness, and compliance with data protection standards, as emphasised by Al-Jawarneh and Mohammed (2022). Building on this definition, a comprehensive assessment framework was developed from established scholarly models and empirical studies to rigorously explore the e-learning platforms of RUFORUM member universities within the context of Agricultural Innovation Management and Facilitation.

For the e-learning platform quality, key parameters, such as accessibility, usability, and security/privacy were integrated into the framework. This draws on the works of several scholars (Kraleva et al., 2019; Toan et al., 2021; Timbi-Sisalima et al., 2022**),** who emphasise accessibility as a core determinant of platform inclusiveness and learner engagement. Additionally, Ghann et al. (2022) highlight the importance of user-centred design principles, navigation simplicity, and response time, in fostering platform usability, which directly influences learner satisfaction and retention. Furthermore, the framework incorporates privacy and security/privacy aspects as critical evaluative components, consistent with the recommendations of Al-Jawarneh and Mohammed (2022), who underscore compliance with international data protection standards and the safeguarding of user information as indispensable elements of quality assurance. These integrated criteria serve to ensure that e-learning

platforms are accessible, user-friendly, and secure. Thereby enhancing their effectiveness in diverse educational settings. For each of the criteria, sub-criteria were developed (see Table 1 and Figure 1).

Quality assessment of existing e-learning platforms

The quality e-learning framework developed in this study served as the primary tool for assessment of the effectiveness of existing e-learning platforms. The assessment was conducted using qualitative methods, including key informant interviews with open-ended questions designed to capture feedback on platform accessibility, overall usability, and data privacy. Additionally, expert reviews of the framework criteria were carried out to ensure rigour and reliability in the evaluation process. This approach allowed for a comprehensive and systematic analysis of each platforms' strengths and weaknesses.

Four universities were selected as case studies from the total number of universities with e-learning platforms. Each represented a distinct typology based on key e-learning adoption drivers. These drivers included technological advancements that facilitated the integration of e-learning, the impact of the COVID-19 pandemic as a catalyst for digital learning, institutional policies supported by governmental- and private-sector initiatives, and the increasing demand for flexible and accessible education in higher learning institutions. The selected e-learning platforms were assessed based upon the quality e-learning framework developed to evaluate their performance, and identify best practices, challenges, and opportunities for improvement.

To ensure a robust data collection process, an inception meeting was organised by RUFORUM, which brought together representatives (including School Deans, platform administrators and teachers) from its member universities to present the study's objectives, engage key stakeholders, and map e-learning platforms. Following this, a list of key informants was compiled to provide deeper insights into the four selected e-learning platforms. The study categorised informants into three groups to address different perspectives on e-learning (see Table 2). The first category comprised of e-learning platform administrators, who provided insights into data protection policies, privacy concerns, and challenges related to the development and maintenance of the platforms. The second group included teachers and content developers, who discussed the difficulties they faced in creating digital materials and adapting traditional teaching methods to online learning environments. The third group consisted of students or trainees, who shared their experiences regarding platform accessibility, usability, and overall engagement. The information from students was collected using a survey questionnaire (see Annex B). The interviews with administrators, teachers, and content developers were guided by a checklist (see Annex C).

Table 1: Criteria for e-learning platform quality assessment.

Aspect	Criteria	Sub-criteria	Description
E-learning platforms quality	**Accessibility**	A1: Compatibility with assistive technologies	The platform should support tools, such as screen readers for visually impaired users, voice commands, and keyboard navigation.
		A2: Clarity and inclusive design	Fonts, colours, and layouts should be easy to read and easily understood by everyone, including individuals with visual impairments.
		A3: Alternative formats for content	The content offers multiple ways to access information, including captions for videos, transcripts for audio, and text alternatives for images.
	Usability	U1: Design	The site's appearance should generate a positive impression that will hold the user's attention from as soon as they arrive on the site onwards.
		U2: Response rate	Relates to the time taken to load the information requested by the user. If too much time is required to download data from the site, the risk of users switching to other websites is enhanced.
		U3: Navigation	Relates to the directions for accessing relevant information by the user. An easy navigation system can reduce search time and increase satisfaction level.
		U4: User-friendliness	Relates to the site's simplicity. Easily understood navigation supports correct use of the site and enhances user satisfaction levels.
		U5: Communication tools	Enable interaction between lecturers and students through e.g. Online chat, forums, and email messages.
		U6: Learning skill tools	This includes creating activities and providing learning tools, such as those with SCORM2 (Sharable Content Object Reference Model) Compliance, lectures as web pages, documents, presentations, videos etc., assignments, and exercises as web pages, documents, quizzes, gamification, evaluation.
		U7: Devices compatibility	The platform should be accessible via various devices, including mobile phone, tablet, and laptop computer.
	Security and privacy	S1: Measures to protect user data and content.	The capacity of the e-learning platform to protect user data and content, and to ensure compliance with data protection standards.
		S2: Compliance with local data protection laws or GDPR	The capacity of the e-learning platform to comply with local data protection laws or regulations, such as GDPR.

[2] SCORM Explained 101: One Minute SCORM Overview

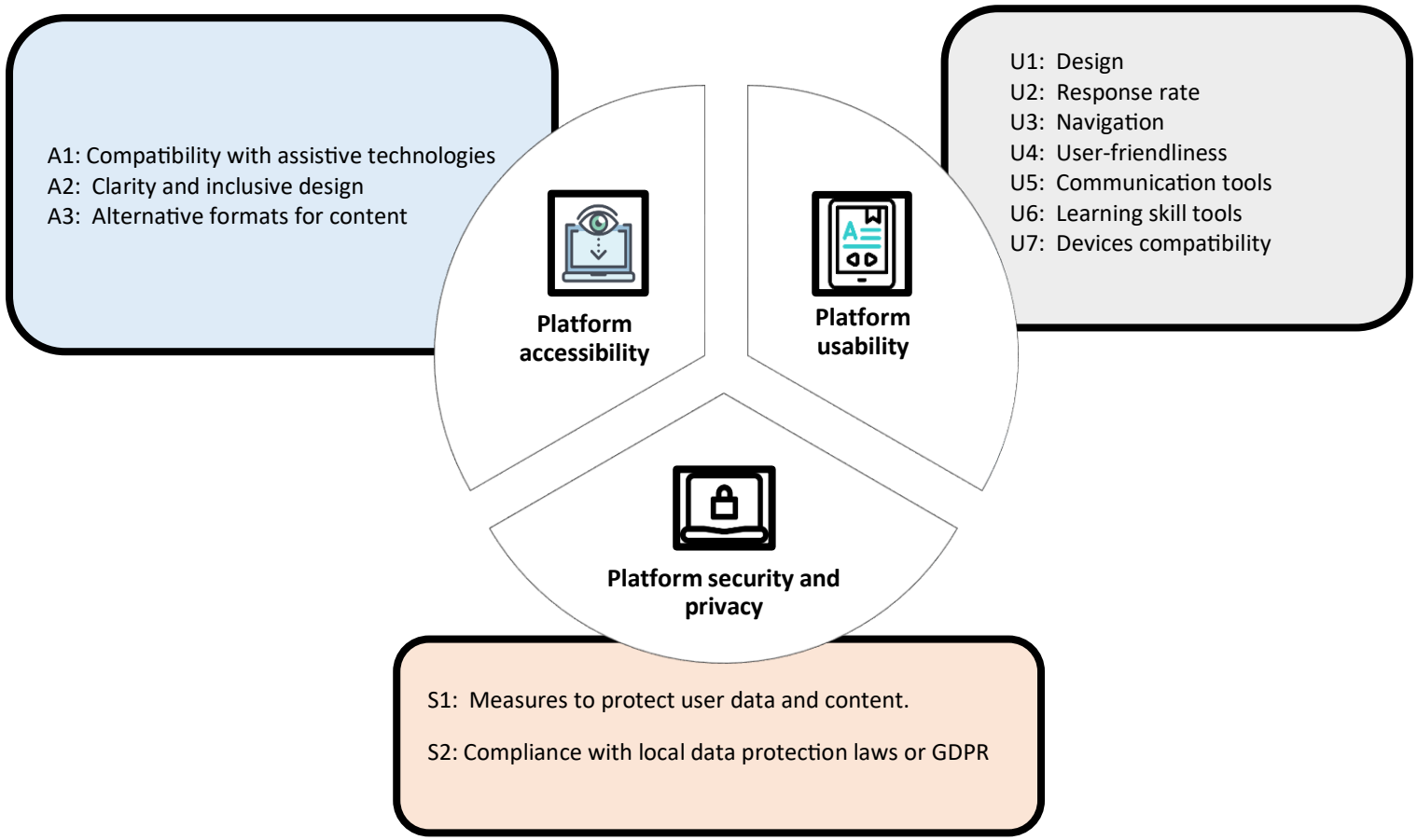


Figure 1: E-learning Platform Quality Assessment Framework.

Table 2: Details on the key data to be collected from each stakeholder

Type of stakeholder	Number of respondents	Data collection methods	Key information gathered
Platform Administrators	4(1 respondent/university)	Semi-structured interview guided through a checklist	– Drivers and challenges in developing and maintaining e-learning platforms. – Integration of platforms into university curricula and their alignment with Master's Degree programmes on AIMF. – Opportunities for mutualisation of resources and collaboration with other universities or platforms. – Data protection and privacy measures. – Accessibility features for users with disabilities or limited connectivity.
Trainers/Teachers/Faculty Staff (Content Developers)	8 (2 respondents/university)	Semi-structured interview guided through a checklist	– Challenges in developing or delivering digital materials for Agricultural Innovation Management and Facilitation. – Challenges faced in adapting traditional teaching methods to e-learning platforms. – Perceived strengths and limitations of the e-learning approach. – Feedback on platform usability, accessibility, and integration with curricula.
Trainees	32 (8 respondents/university)	e-Survey	– User experience with e-learning platforms (navigation, accessibility, engagement). – Relevance and practicality of the content in achieving learning outcomes and career objectives. – Main barriers to effective use of e-learning platforms (e.g. Internet access, content gaps). – Suggestions for improving e-learning platforms and content to meet the needs of AIMF Master's Degree programmes. – Perception of how e-learning supports their attainment of university credits and enhances professional Innovation Management and Facilitation skills. – Features or practices that enhance their interest and participation. – Barriers to consistent engagement with the platform. – Additional features or improvements they would like to see on the platform.
Total	**42**		

Lessons learned on the use of e-learning platforms

Insights were gathered from platform administrators and trainers to gain a comprehensive understanding of the strengths, limitations, effectiveness, and best practices associated with e-learning platforms. Specific questions which addressed these aspects were incorporated into the interview guide and surveys and enabled thorough exploration of the interviewees' experiences in developing and maintaining e-learning content**.**

2.3 Data analysis methods and tools

This study utilised a mixed-methods approach that combined both qualitative and quantitative data analysis techniques.

From a quantitative perspective, the responses were effectively summarized through the calculation of percentages. Graphical representations, particularly radar charts, were utilised to present the data visually, especially for illustration of the results of the platform assessments. These assessments were informed by user feedback and expert evaluations. Experts assigned scores to each sub-criterion within the three primary categories: accessibility, usability, and security/privacy. Each sub-criterion was rated on a scale from 0% to 100% using the following performance levels:

- Very Strong (++++; 100%): The sub-criterion is fully and strongly represented on the platform.
- Strong (+++; 75%): The sub-criterion is well-represented.
- Moderate (++; 50%): The sub-criterion is moderately represented.
- Weak (+; 25%): The sub-criterion is poorly represented.
- Not represented (-; 0%): The sub-criterion is absent.

From a qualitative perspective, thematic analysis was performed on the data to identify recurring themes and patterns. A narrative summary was subsequently developed to contextualise and complement the quantitative findings and provide a deeper understanding of the results.

3. Findings

3.1 Mapping of RUFORUM member universities' e-learning platforms

A total of 170 RUFORUM member universities were considered in the mapping (Annex A).From these, 80% had an LMS, while 20% did not (Figure 2). Of the universities with an LMS, 67% had made their platform publicly accessible, whereas 13% had LMS platforms that were not publicly available (Figure 3).

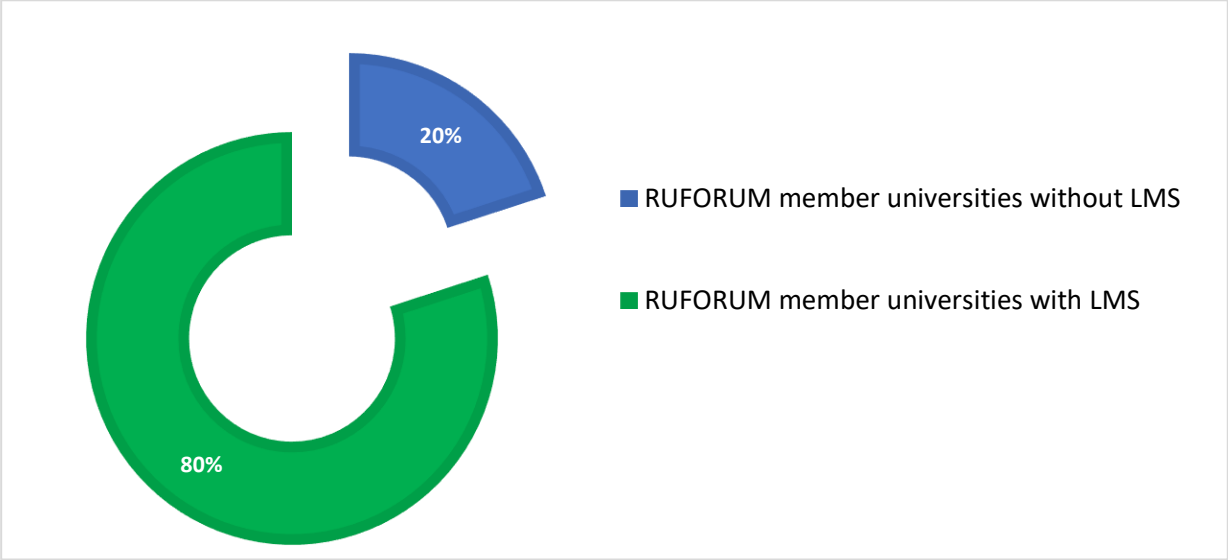


Figure 2: Percentage of RUFORUM member universities with LMS and without LMS.

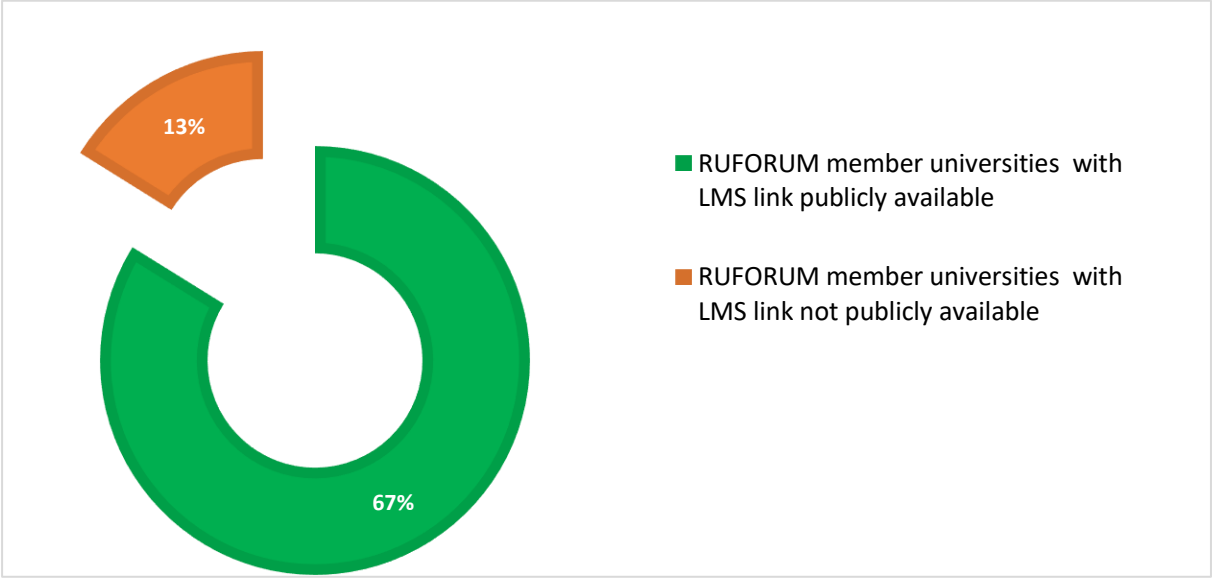


Figure 3: Percentage of RUFORUM member universities with LMS link publicly available and not publicly available.

3.2 Drivers of e-learning adoption across African universities

The adoption of e-learning across African universities has gained significant momentum in recent years, driven by a combination of external pressures and internal institutional strategies. While digital education presents an opportunity to expand access to quality learning, several key factors have

influenced its widespread implementation. Specific crises (political crises and the COVID-19 pandemic) have served as major catalysts in accelerating the transition to online platforms. Additionally, growing demand for flexible education, governmental policies, private-sector initiatives, and advancements in technology have contributed to the shift towards digital learning.

Crises

The COVID-19 pandemic and political crises significantly accelerated the adoption of e-learning in Africa, as universities were compelled to quickly shift from traditional face-to-face instruction to online learning platforms to ensure academic continuity (Lukose et al., 2021; Etta, 2024). In response to widespread lockdowns and school closures caused by COVID-19, institutions have embraced virtual classrooms and video conferencing tools, such as Zoom, Microsoft Teams, and Google Meet, along with digital assessments to sustain education. In addition, governments and universities launched emergency e-learning initiatives, providing free or subsidised Internet access, distributing tablets and laptops to students, and broadcasting educational content through radio and television for those without reliable Internet connectivity.

In some African countries, such as Cameroon and South Sudan, political crises have also imposed a shift toward digital learning solutions. In conflict-affected regions, e-learning has emerged as a vital tool to ensure educational continuity when physical access to schools is unsafe or impossible. According to Etta (2024), in Cameroon, during the current socio-political armed conflict students in crisis zones have demonstrated strong motivation to persevere through online learning, despite encountering technological and emotional challenges. This reflects a broader trend, in which political instability accelerates digital transformation in education, enabling learners to maintain progress even in unstable environments.

Demand for flexible, accessible education in higher learning institutions

The increasing demand for higher education across Africa has pushed universities to find scalable and cost-effective solutions, making e-learning a crucial alternative to traditional classroom-based instruction. With growing student enrolment and limited physical infrastructure, universities are leveraging digital learning models to reach more learners without the need for extensive campus expansion. Massive Open Online Courses (MOOCs) and digital course materials have allowed students, particularly those in remote areas, to access quality education beyond traditional Degree programmes (Ansong et al., 2017). For example, this has been the case in Cameroon, Nigeria, and Uganda, where the number of students continues to grow each year. For instance, in Cameroon, tertiary enrolment surged by 175% from approximately 120,000 in 2006, to over 320,000 in 2018[3]. Nigeria's universities enrolled more than 1.8 million undergraduate students in 2019, with federal institutions accommodating the majority[4]. Similarly, Uganda's public universities experienced a 17% increase in enrolment, rising from 90,359 in 2018/19 to 105,988 in 2019/20[5]. However, many students are unable to secure university admission due to limited available spaces. In some countries, such as Nigeria, the demand for university education far exceeds the available spaces. For instance, in 2024, Nigeria's universities could only admit 700,000 out of approximately two million applicants, leaving over 1.3 million qualified candidates without admission opportunities[6]. This significant shortfall emphasizes the

[3] https://shorturl.at/UmlQa
[4] https://shorturl.at/wr2Uw
[5] https://shorturl.at/6vakD
[6] https://shorturl.at/Mgm5P

pressing need for alternative educational pathways, such as e-learning platforms, to accommodate the growing number of students seeking higher education.

Furthermore, labour market demands for digital skills and continuous upskilling have made e-learning an attractive option for working professionals seeking flexible education pathways. Employers increasingly recognise online certifications and digital credentials that encourage students to enrol in flexible digital learning programmes which allow them to gain industry-relevant skills while balancing work and family commitments (Kemeh, 2018). Additionally, universities, such as Nkumba University and Kabale University, are embracing blended learning models - a combination of online and offline education, to ensure greater accessibility for students with limited Internet connectivity (Azeez & van der Vyver, 2018). As a result, e-learning is becoming an essential strategy for African universities to expand educational access, promote lifelong learning, and bridge the digital divide in higher education.

Institutional policies, governmental support, and private-sector initiatives

Government policies, institutional strategies, and private-sector collaborations have played a pivotal role in accelerating e-learning adoption in African universities. Many African governments have introduced national ICT policies, digital education initiatives, and e-learning strategies to modernise higher education and expand access to quality learning resources (Kemeh, 2018). For instance, in Nigeria, the National Universities Commission has suggested the creation and development of e-learning to produce globally competitive entrepreneurial graduates who are relevant to national development.

At Kabale University in Uganda, stakeholder partners, including RUFORUM, the Commonwealth Secretariat, and the Ugandan Government have supported the provision of materials, such as laptop computers, to equip the digital university centre. It is noted that universities themselves are driving digital transformation, investing in faculty training, and expanding their online course offerings to integrate hybrid learning models (Ansong et al., 2017). For instance, in 2023, Kabale University inaugurated a state-of-the-art e-learning hub as part of a collaborative initiative involving six African universities and École Polytechnique Fédérale de Lausanne (EPFL). This centre aims to enhance digital learning capabilities and foster innovation in higher education. International development agencies have also played a significant role by funding e-learning infrastructure projects, teacher-capacity-building programmes, and access to digital resources (Patel et al., 2018). Collaborative efforts between governments, universities, and the private sector, continue to strengthen digital education, ensuring that African institutions can offer competitive and globally recognised e-learning programmes.

Technology and infrastructure advancements

The rapid expansion of information and communication technology across Africa has been a major driver of e-learning adoption in universities. Increased Internet penetration, the rollout of fibre-optic networks, and improvements in mobile technology have significantly enhanced access to digital learning resources (Azeez & van der Vyver, 2018). Submarine cable connections and national broadband expansion projects have been crucial in reducing Internet costs, allowing more students and educators to engage with online learning platforms. The widespread adoption of 4G networks and the gradual rollout of 5G technology in some African countries, such as Ghana, Ivory Coast, and Nigeria[7], for instance, further improve Internet speeds and reliability, addressing the previous challenges of poor connectivity in remote areas. Moreover, the affordability of smartphones, tablets,

[7] 2024 – GSMA Mobile Connectivity Index

and laptops has empowered learners and faculty members to participate in digital education more conveniently (Patel et al., 2018).

The integration of cloud-based Learning Management Systems (LMS), such as Moodle, Sakai, Blackboard, Canvas, and Google Classroom, has revolutionized higher education, enabling institutions to scale digital learning, manage coursework, and facilitate seamless interaction between students and instructors (Ansong et al., 2017). This shift is evident in several African universities, including Nkumba University and Kabale University in Uganda, which both use Moodle to deliver blended and flexible learning programmes to thousands of students. The University of Bamenda in Cameroon also adopted Moodle as its core LMS in response to disruptions caused by the COVID-19 pandemic and socio-political unrest, while the University of Port Harcourt in Nigeria developed its own customised LMS under its Open and Distance e-Learning initiative to support professional training and degree programmes

In addition, recently, Artificial Intelligence (AI) and adaptive learning technologies have been integrated into some platforms to provide personalised learning experiences that allow students to progress at their own pace while receiving tailored content recommendations. The rise of mobile learning applications has further expanded educational opportunities, particularly in rural and underserved communities, where mobile devices are more prevalent than traditional computers.

3.3 Challenges affecting the effectiveness of e-learning platforms in Africa

Infrastructure and connectivity (Internet and network issues)

One of the most significant challenges affecting the effectiveness of e-learning platforms in Africa is poor Internet infrastructure and high connectivity costs. Many universities struggle with limited free Internet access, and the high bandwidth cost consumes nearly half of the digital transformation budget, making large-scale online learning unsustainable. Unstable network connections frequently disrupt virtual classes, assessments, and online interactions, creating frustration among students and faculty. As of 2023, according to the World Bank Group[8], Internet penetration remains highly uneven across the continent, and is estimated at around 41.9% in Cameroon, but only about 39.2% in Nigeria, and 15.3% in Uganda. These disparities underline the 'digital divide' that continues to limit consistent access to online education for students in many African universities. Additionally, for instance, at the University of Nkumba in Uganda, many students and academic staff lack access to personal digital devices, such as laptops or smartphones, further limiting their ability to participate in e-learning. Universities also face difficulties in maintaining essential hardware infrastructure, such as servers and cloud-based Learning Management Systems, which are crucial for supporting large numbers of online learners.

Electricity

Unreliable electricity supply is another major obstacle to the success of e-learning in Africa. According to the *Tracking SDG7* database (2023)[9], access to electricity varies across countries. Uganda has 47% of its population connected to electricity, Cameroon 71%, Nigeria 61%, and Ghana 85%. These gaps in electrification reflect the uneven capacity of universities to deliver stable and uninterrupted digital learning experiences. Frequent power outages make it difficult for students and educators to access online learning platforms consistently. In rural areas, as per the location of Kabale University, for example, electricity access is often below the national average, leading to challenges such as frequent power outages and limited connectivity. One teacher, an assistant lecturer, who was interviewed at

[8] World Development Indicators | DataBank
[9] Tracking SDG 7 | Progress Towards Sustainable Energy

the University of Kabale, stated that: "*We frequently experience power outages at the University, which hinders our ability to fully realise the potential of e-learning.*"

In many cases, institutions rely on back-up generators, which are expensive and unsustainable in the long-term. Students in rural- and semi-urban areas are particularly affected, as they often experience prolonged power cuts, making it impossible to follow online courses or complete digital assignments. Institutions with digital infrastructure, such as servers and data centres, also face risks when power interruptions occur, leading to data loss and service disruption.

Financial constraints

Financial limitations significantly hinder the effectiveness of e-learning platforms, as many African universities lack the funding necessary to build and maintain digital education infrastructure. The high cost of Internet bandwidth alone consumes a substantial portion of university budgets, leaving little room for investments in other critical areas, such as faculty training, content development, and digital resources. Additionally, lack of governmental investment in digital education further exacerbates the situation, preventing institutions from establishing dedicated video creation centres, audio recording studios, and other essential content production facilities. Moreover, content development is often seen as an extra workload for teachers. Without financial incentives or institutional support, many teachers lack the motivation to create high-quality digital courses.

Human resources and mindset change

The successful implementation of e-learning platforms in Africa is also hindered by a shortage of skilled personnel and resistance to digital transformation. Many universities struggle to find and retain competent staff with expertise in both technical support and digital pedagogy, making it difficult to manage online learning systems. Additionally, faculty resistance to change remains a major barrier, as many educators prefer traditional teaching methods and view digital education as less effective. The mindset shift required for successful e-learning adoption is slow, as both students and academic staff are accustomed to in-person interactions and may not fully embrace virtual learning. Digital illiteracy further complicates matters, as many teachers lack the technical skills needed to create engaging online courses.

3.4 Typology of e-learning mapped based on drivers

The establishment and expansion of e-learning platforms in African universities have been driven by a combination of National/institutional policies and partner support, crises, such as the COVID-19 pandemic, and political instability, increased demand for flexible education, and technological and infrastructural advancements. However, the relative importance of these drivers varies significantly across institutions, shaping their approach to digital transformation. A single dominant driver strongly influenced some universities, while others experienced a moderate or weak impact from multiple factors. The categorisation of these drivers provides a structured understanding of the motivations behind e-learning adoption and implementation in different institutional contexts.

University of Bamenda (Cameroon) – Policy-driven e-learning implementation

The University of Bamenda launched its e-learning platform in March 2020, fully funded through its internal budget. Its development was primarily a policy-driven response to the twin crises affecting Cameroon's English-speaking regions: a socio-political armed conflict and the COVID-19 pandemic, both of which disrupted academic activities and necessitated urgent digital solutions (Etta, 2024). The university leveraged its resources to establish the platform in alignment with institutional policies. While institutional policy played a dominant role (+++) in driving the shift to e-learning, the pandemic

further accelerated the transition (++). Technological advancements and the demand for flexible education played more modest roles (+) (Table 3). Currently, the platform is being integrated into a national e-learning framework, supported by the recent opening of a Government-constructed University Digital Development Centre (UDDC) on campus.

Table 3: Typology of e-learning platforms in African universities based on key drivers.

	National/institutional policy and partner support	Crises (COVID-19/ Political crises)	Increased demand for flexible education	Technological and infrastructural advancements
University of Bamenda	+++	++	+	+
Kabale University	++	+++	-	+
Nkumba University	-	-	+++	++
University of Port Harcourt	++	-	+	+++

Scale : +++ : Strong ; ++ : medium ; + : weak; -: not applicable

Kabale University (Uganda) – Crisis-driven e-learning adoption

Kabale University established its e-learning platform in January 2020, fully set up and funded by the university itself. The digital transformation was strongly driven by the COVID-19 pandemic (+++), which compelled the institution to rapidly implement online learning strategies to ensure academic continuity. Although institutional policies and some external support (++) facilitated the development of the necessary infrastructure, the shift was primarily reactive, aimed at addressing immediate disruptions, rather than fulfilling a pre-existing strategic vision. Technological and infrastructural advancements (–) and the general demand for flexible education (+) played lesser roles, indicating that before the pandemic, digital learning had not been a central institutional focus (Table 3).

Nkumba University (Uganda) – Demand-driven e-learning evolution

Nkumba University launched its e-learning platform in February 2020 through a collaborative effort between university staff and Tech Consults Limited. The initiative was fully funded internally by the University's own resources budget. Unlike Kabale and Bamenda, Nkumba University's e-learning development was primarily driven by the increasing demand for flexible education (+++), which positioned digital learning as a core component of its institutional approach. Technological and infrastructural advancements (++) further supported this vision by enabling the creation of adaptive learning environments. In contrast, institutional policies and governmental support (–), as well as the COVID-19 pandemic (–), had limited influence, indicating that the university's transition to e-learning was a strategic, forward-looking decision rather than a reactive measure (Table 3).

University of Port Harcourt (Nigeria) – Technology-Driven E-Learning Implementation

The University of Port Harcourt established its e-learning platform in 2021 through a partnership between the University and the Africa Centre of Excellence for Oil Field Chemicals and Research (ACE-CEFOR), which also provided the funding for the initiative. The University stands out as a technology-driven e-learning institution, for which technological and infrastructural advancements (+++) provide the main force behind digital learning adoption, supported by institutional policies (++). It leveraged

digital tools, online platforms, and innovative learning management systems to create a scalable and sustainable e-learning framework. Demand for flexible education (++) also played a supporting role in ensuring the long-term viability of its online education system. However, the COVID-19 pandemic (–) had little to no direct influence on the digital transformation of the University (Table 3).

From this analysis, four distinct typologies of e-learning platforms are evident based upon the dominant drivers influencing their establishment and expansion:

- **Policy-driven e-learning platforms**: Universities at which institutional policies, governmental initiatives, and private-sector support were the strongest catalysts for digital transformation (e.g. Université de Bamenda).
- **Crisis-driven e-learning platforms**: Institutions at which the COVID-19 pandemic or political crisis served as the primary trigger for online learning adoption (e.g. Kabale University).
- **Demand-driven e-learning platforms**: Universities that developed e-learning systems primarily in response to the growing need for flexible and accessible education (e.g. Nkumba University).
- **Technology-driven e-learning platforms**: Institutions at which technological advancements were the primary enablers of digital transformation (e.g. The University of Port Harcourt).

The findings suggest that e-learning adoption is not uniform across African universities. Each institution's digital transformation journey is shaped by specific contextual factors that influence the pace, sustainability, and effectiveness of online education.

4. Assessment of e-learning platforms by typology

To deepen our understanding of university e-learning platforms in Africa, four universities were selected for assessment, with each representing a distinct typology of driving factors. The evaluation was limited to four platforms due to access constraints caused by institutional regulations at certain universities. Table 4 presents the results of the e-learning platform assessments for the selected universities.

Table 4: E-learning platform quality assessment results

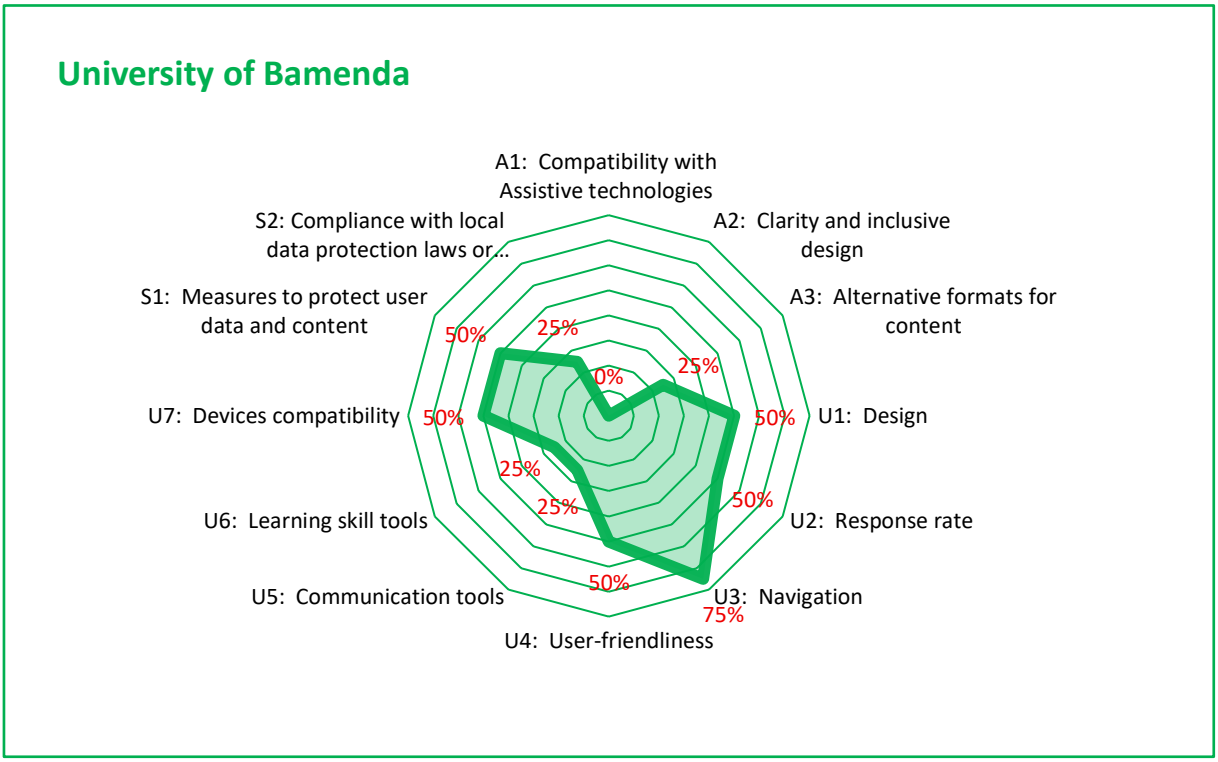
Criteria	Sub-criteria	Description	University of Bamenda	Kabale University	Nkumba University	University of Port Harcourt
Accessibility	P1: Compatibility with assistive technologies	The platform should support tools, such as screen readers for visually impaired users, voice commands, and keyboard navigation.	-	++++	++++	-
	P2: Clarity and inclusive design	Fonts, colours, and layouts should be easy-to read and easily understood by everyone, including individuals with visual impairments.	-	+++	+++	-
	P3: Alternative formats for content	The content offers multiple ways to access information, including captions for videos, transcripts for audio, and text alternatives for images.	+	++++	+++	+++
Usability	P4: Design	The site's appearance should generate a positive impression that will hold the user's attention from as soon as they arrive on the site onwards.	++	+++	+++	++
	P5: Response rate	Relates to the time taken to load the information requested by the user. If data takes too much time to download from the site, the risk of users switching to other websites increases.	++	+++	++++	++
	P6: Navigation	Providing clear directions to access relevant information helps users navigate more easily, reduces search time and increases user satisfaction levels.	+++	++++	++++	++
	P7: User-friendliness	Denotes the site's simplicity. If correct use of the site is easily understood, user satisfaction levels are enhanced.	++	++++	++++	++
	P8: Communication tools	Allows interaction between lecturers and students through Chat, forums, and email messages.	+	++++	++	+
	P9: Learning skill tools	This includes the creation of activities and learning tools, such as SCORM Compliant, lectures as web pages, documents, presentations, videos etc.,	+	++++	++	-

		assignments, and exercises as web pages, documents, quizzes, gamification, evaluation.				
	P10: Devices compatibility	The platform should be accessible through a variety of devices, such as by mobile phone, tablet, or laptop computer.	++	++++	++++	++
Security and privacy	P11: Measures to protect user data and content.	The capacity of the e-learning platform to protect user data and content, and to ensure compliance with data protection standards.	++	+++	++	++
	P12: Compliance with local data protection laws or GDPR	The capacity of the e-learning platform to comply with local data protection laws or regulations, such as GDPR	+	++	++	++
Type of LMS			Moodle	Moodle	Moodle	Self-developed LMS

4.1 E-learning platform of the University of Bamenda

As a policy- and crisis-driven e-learning platform, the University of Bamenda utilises Moodle[10] as its Learning Management System to provide a virtual learning environment and enable students to reach their potential without physical interaction. The platform hosts courses from various faculties, including the Faculty of Science, Faculty of Education, Faculty of Law and Political Science, Faculty of Economics and Management, the College of Technology, the Higher Teachers Training College, the Higher Technical Teachers Training College, the National Advanced Polytechnique Institute, the Higher Institute of Transport and Logistics, the Higher Institute of Commence and Management the Faculty of Health Sciences and the Faculty of Arts. Most course materials date from 2020 to 2021. Currently, the platform features over 600 course categories and more than 800 course units. All courses are fully integrated into the university curriculum, as they were originally designed for traditional, in-person delivery.

The platform primarily serves degree-seeking students, offering structured courses aligned with Undergraduate and Post-Graduate programmes. However, it does not yet provide short courses or professional certification programmes, which could expand its reach to lifelong learners and working professionals. In addition, there are no specific courses related to Agricultural Innovation Management and Facilitation. Figure 4 shows the assessment results of the platform.



Accessibility

The accessibility of the University of Bamenda's e-learning platform is significantly lacking, which makes it difficult for students with disabilities or special learning needs to engage effectively. The platform does not support assistive technologies (-), such as screen readers, voice commands, or keyboard navigation, which means that visually impaired students, or those with motor disabilities,

[10] http://www.unibaonlinelearning.net/

face major barriers in accessing course materials independently. Additionally, there is an absence of clarity and inclusive design (-), indicating that text readability, contrast settings, and adaptable layouts have not been optimised for users with visual impairments or cognitive difficulties. A minor accessibility feature present is the availability of alternative content formats (+), which suggests that some efforts have been made to provide videos, but these are limited and inconsistent across the platform. The lack of accessibility features indicates that a significant portion of students may struggle to fully participate in digital learning, leading to exclusion and unequal learning opportunities.

These findings suggest that urgent improvements are required to enhance accessibility of the platform. Implementing assistive technologies, refining layout and contrast settings, and offering multiple content formats in terms of videos, audio, and images would create a more inclusive learning environment. Without these enhancements, students with disabilities will continue to face difficulties, limiting their ability to benefit from online education on the University's platform.

Usability

The usability of the platform presents a mix of strengths and weaknesses. Navigation is its strongest aspect (+++). This means that students and faculty can move through the platform with relative ease, less frustration and better efficiency. Additionally, the platform's design (++) and response rate (++) indicate that it is visually acceptable and loads information at a reasonable speed. However, user-friendliness (++) is moderate, which suggests that while the platform is relatively easy to use, it does not fully optimise the user experience for all learners, especially those who are less 'tech-savvy'. One of the biggest usability concerns is the lack of robust communication tools (+), which severely limits student-instructor interaction. Without chat functions, discussion forums, or strong email integration, the platform does not foster an interactive learning environment. Similarly, the learning skill tools (+) (such as quizzes and gamification elements), are weakly integrated, making learning less engaging and dynamic. Device compatibility is moderate (++), indicating that students can access the platform on different devices, but the experience may not be fully optimised for mobile users.

This analysis suggests that while the platform is functional, it does not fully support interactive and engaging learning experiences. To enhance usability, it should integrate better communication tools, improve interactive learning features, and optimise mobile accessibility to ensure a seamless and engaging learning environment.

Security and Privacy

The University of Bamenda's e-learning platform has moderate security/privacy features, but lacks strong compliance with data protection laws. The platform has some measures in place to protect user data and content (++). The platform user data is primarily managed by the platform hosting provider and the use of Completely Automated Public Turing Test to tell Computers and Humans Apart (CAPTCHA), [11]meaning that basic encryption and access control mechanisms exist, but they may not be robust enough to handle sophisticated cybersecurity threats. With increasing risks of data breaches and cyber-attacks, moderate security/privacy is insufficient for a platform handling sensitive academic and personal information. An area of concern is compliance with local data protection laws and the General Data Protection Regulation (GDPR) (+), which indicates weak adherence to legal frameworks regarding data privacy, user consent, and secure storage of student information. If user data is not properly managed, it could expose students and faculty to security risks such as data leaks or

[11] CAPTCHA - Wikipedia

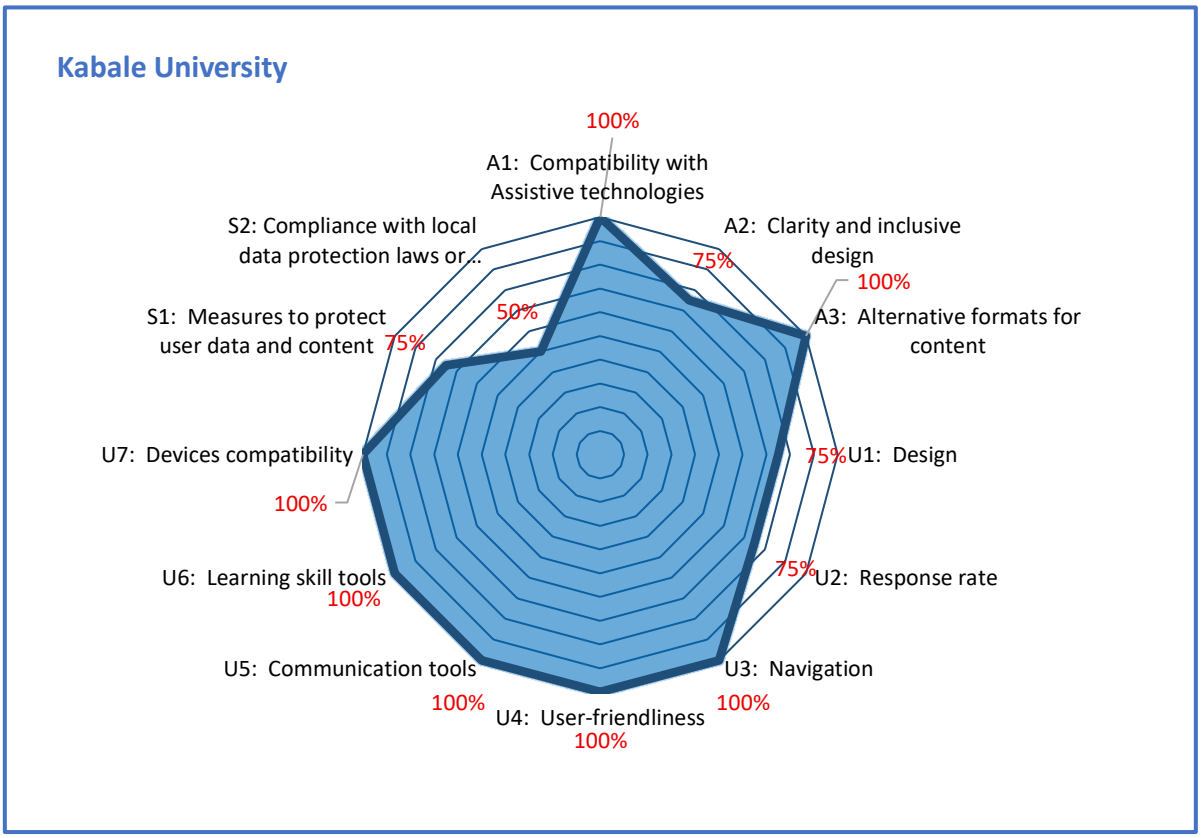
unauthorized access. Strengthening compliance with National and international data protection regulations is crucial for ensuring legal and ethical responsibility in digital learning environments.

4.2 E-learning platform of Kabale University

Driven by the COVID-19 crisis, Kabale University became one of the first public universities in Uganda to successfully conduct classes, exams, and graduation ceremonies online during the COVID-19 pandemic. This milestone was made possible by the University's state-of-the-art multimedia studio, designed to support the production of high-quality online course materials and ensure a smooth transition to digital education.

The University utilises Moodle[12] as its Learning Management System and has further enhanced accessibility through its mobile application - the Kabville App - which enables students to easily access course content from anywhere. Currently, the platform hosts over 170 course units, including three related to Agricultural Innovation Management and Facilitation: Agricultural Extension Practical Skills, Participatory Approaches in Extension, and Extension Methods and Tools. However, these courses are still under development, with content updates that suggest ongoing improvements. All courses are fully integrated into the University's curriculum, with credits allocated accordingly. The platform is exclusively available to students who are enrolled, and does not yet offer short courses or certificate programmes for professionals seeking skill development.

Serving more than 6,000 students across over 80 Undergraduate and Post-Graduate programmes, the platform has significantly expanded learning opportunities at Kabale University. Figure 5 shows the assessment results of the platform.



[12] http://elearning.kab.ac.ug

Kabale University's e-learning platform excels in accessibility, which makes it highly inclusive for diverse learners. The platform has very strong support for assistive technologies (++++), meaning it is well-equipped for screen readers, keyboard navigation, and voice commands, allowing students with visual impairments or motor disabilities to access learning materials seamlessly. Additionally, clarity and inclusive design (+++) ensure that fonts, colours, and layouts are optimised for readability, enhancing the experience for students with visual impairments or cognitive difficulties. One of the platform's greatest strengths is alternative content formats (++++), meaning that students can access videos and audio, which makes learning flexible and adaptable to different needs.

These results suggest that Kabale University has made significant efforts to ensure platform accessibility, setting a strong example in inclusive digital learning. The presence of assistive technologies and multiple content formats ensures that students with disabilities can engage effectively. However, continued improvements in contrast settings, font adaptability, and personalised accessibility features could further enhance the learning experience.

Usability:

The platform's usability is one of its strongest aspects, with well-balanced functionality and engagement features. The design (+++) is visually appealing, which ensures that students and faculty have a positive first impression and can navigate easily. The response rate (+++) indicates that the platform loads content quickly and efficiently, minimising frustration and ensuring smooth access to materials. The navigation system (++++) is a standout feature, allowing students to locate courses, assignments, and discussions with minimal effort, which reduces time spent searching and increases overall satisfaction.

The platform also provides strong user-friendliness (++++), meaning that even students with limited technical skills could easily use it. Communication tools (++++), including forums, chat, and email features, facilitate strong student-lecturer interaction, crucial for engagement in digital learning environments. Learning skill tools (++++), such as SCORM-compliant content and assignments, make learning more engaging and interactive. Device compatibility (++++) ensures that students can access the platform from laptop computers, tablets, and mobile devices, which improves accessibility for those who rely on mobile learning.

This analysis suggests that Kabale University's e-learning platform offers a well-structured, engaging, and user-friendly experience. The combination of efficient navigation, interactive tools, and communication features makes it highly effective for digital education. However, periodic user feedback and continuous optimisation could further enhance the user experience.

Security and Privacy:

Security and privacy are well-handled, but there is scope for improvement. The platform has strong measures to protect user data (+++), which means that basic encryption, access control, and security protocols are in place to safeguard students' and faculty members' information. As protection measures, daily backups to both local- and off-site servers are performed, and users are required to verify their authenticity via university emails. Staff are also trained in security practices to prevent any threats to users' data. While some adherence to data privacy regulations exists, it is not of the highest standards. Without clear policies on data retention, user consent management, and third-party data sharing, there may be vulnerabilities in regulatory compliance. In a digital learning environment within which, personal and academic data are constantly processed, full alignment with National- and international data protection laws is essential.

The assessment suggests that while the platform has strong security features, improvements in compliance with GDPR and other legal frameworks are required. Strengthening data encryption, ensuring full regulatory compliance, and providing clear data privacy policies would reinforce trust in the platform and protect users more effectively.

4.3 E-learning platform of Nkumba University

Nkumba University is a private, not-for-profit institution that has established itself as a leading hub for high-quality education and research in Uganda and the wider region. Primarily driven by the growing demand for flexible learning, the University's e-learning platform hosted on Moodle[13] provides access to over 100 academic programmes, serving a student population of more than 6,000. The platform is highly user-friendly, incorporating a variety of engaging teaching techniques, including informative videos, interactive diagrams, infographics, and quizzes, all designed to enhance student engagement and improve learning outcomes.

In terms of courses related to Agricultural Innovation Management and Facilitation, none are currently offered on the platform. However, within the Agriculture discipline, the University provides courses on Agricultural Sustainability, Agriculture and the Environment, and Agribusiness Systems and Planning. Figure 6 shows the assessment results of the platform.

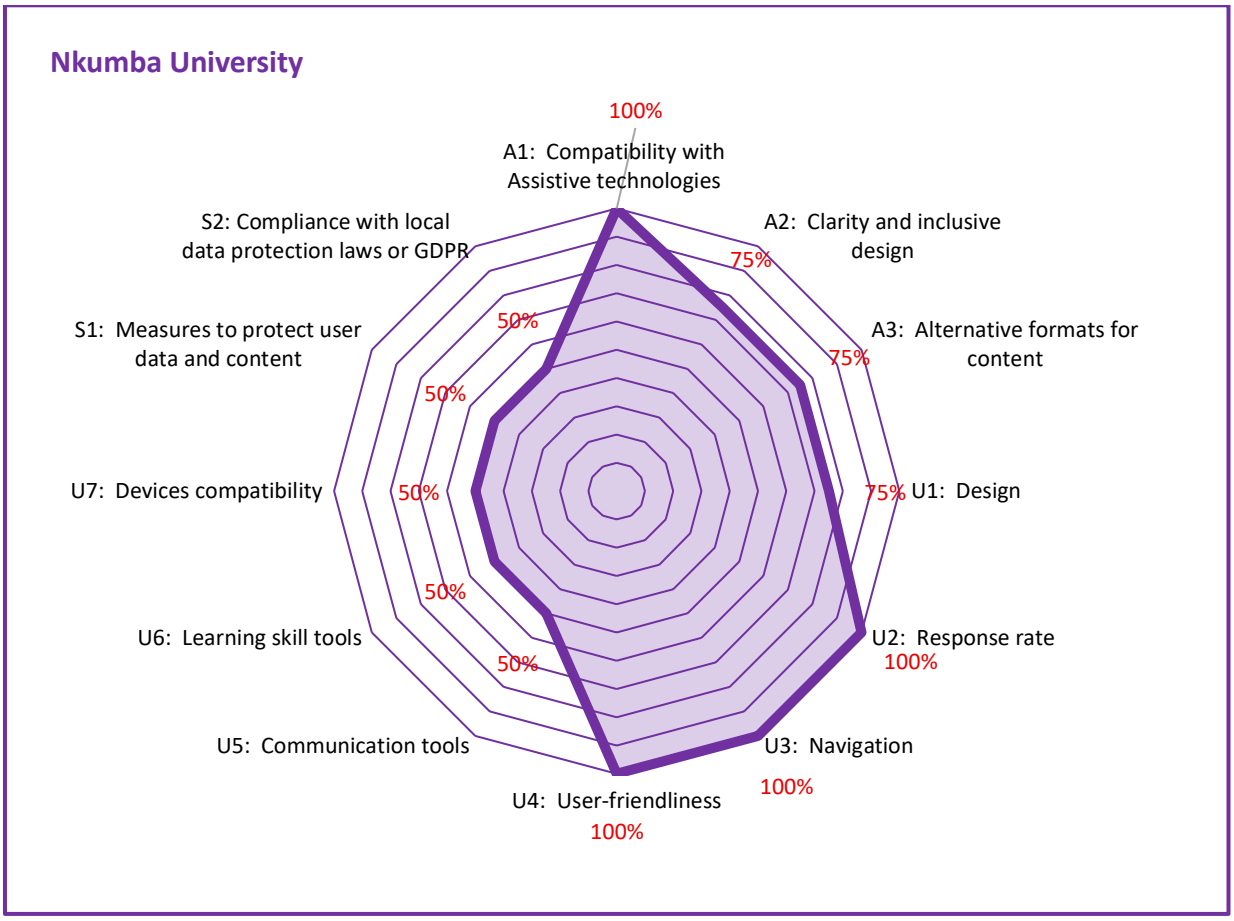


Figure 6: Nkumba University's e-learning platform quality assessment.

[13] https://elearning.nkumbauniversity.ac.ug/login/?lang=en

Accessibility:

The accessibility of Nkumba University's e-learning platform is very strong, which ensures that students with diverse needs can engage with online learning effectively. The platform has very strong compatibility (++++) with assistive technologies, which means that it supports screen readers, keyboard navigation, and voice commands, making it accessible for visually impaired users and those with motor disabilities. This is a significant strength, as it ensures that all students, regardless of ability, can navigate and interact with course materials seamlessly. Additionally, clarity and inclusive design (+++) indicate that fonts, colours, and layouts have been well-structured to enhance readability and comprehension. However, while this is commendable, further refinement in contrast settings and font adaptability could make the platform even more accessible for students with visual impairments.

The platform also performs strongly (+++) in offering alternative content formats, meaning students can access learning materials in multiple formats, such as video captions, audio transcripts, and text-based content. This makes the platform adaptable for students with hearing impairments, those with low Internet bandwidth, or learners who prefer varied content formats. Despite these strengths, maintaining consistency in offering well-structured alternative content across all courses should be a key focus to ensure that accessibility remains comprehensive.

The results of the assessment indicate that Nkumba University's e-learning platform prioritises accessibility and inclusivity. The strong assistive technology support, clear design, and availability of alternative content formats make it one of the more accessible platforms among the universities studied. However, continued improvements in contrast settings, font customisation, and ensuring that all courses consistently provide alternative formats would further enhance accessibility for a broader range of students.

Usability:

The usability of the platform is one of its strongest aspects, with well-structured navigation (++++), a visually engaging design (+++), and a very fast response rate (++++). The strong navigation system allows students and faculty to move through the platform effortlessly, with reduced search time and better efficiency in accessing learning materials. A fast response rate ensures that users do not experience delays when opening course content, submitting assignments, or participating in discussions. This enhances the overall experience.

The platform is also very user-friendly (++++), which means that even students with limited technical knowledge can easily navigate and utilise the available features. This ease of use is further reinforced by strong device compatibility (++++), which ensures that students can access the platform on mobile phones, tablets, and laptop computers, without experiencing functionality issues. However, while the core usability aspects are strong, communication tools (++) and learning skill tools (++) remain only at a medium level. This suggests that while the platform allows for basic interaction through forums, chat, and emails, it lacks more advanced communication features that would enhance real-time engagement. Similarly, learning skill tools, such as SCORM-compliant content, quizzes, gamification, and interactive exercises, are only moderately developed, limiting opportunities for students to engage in active and dynamic learning.

This assessment implies that Nkumba University's e-learning platform is highly functional, easy to navigate, and provides a seamless user experience. However, improvements in communication tools

and interactive learning features would make the platform even more engaging and supportive of student collaboration and learning outcomes.

Security and Privacy:

While Nkumba University's e-learning platform has some security measures in place, it lacks strong compliance with data protection regulations. The platform has moderate (++ security measures to protect user data, which means that basic encryption and access control mechanisms exist. However, the absence of advanced security features, such as multi-factor authentication (MFA) or end-to-end encryption, raises concerns about potential vulnerabilities to cyber threats. As cyberattacks and data breaches become more sophisticated, relying on basic security measures is insufficient, especially for a platform that stores student academic records, personal data, and communication logs.

A lack of clear policies on data retention, third-party access, and user consent management could create legal and ethical challenges regarding how student data is handled. Given the increasing focus on data privacy and security in digital learning environments, Nkumba University must strengthen its regulatory compliance and transparency in handling user data.

This assessment suggests that while the platform has foundational security/privacy measures, they are not sufficient to fully protect user data from evolving cybersecurity threats. Enhancing encryption, implementing multi-factor authentication, and ensuring complete alignment with data protection laws will be crucial in building trust among users and ensuring a secure digital learning environment.

4.4 E-learning platform of the University of Port Harcourt

As a technology-driven e-learning platform, the Open, Distance, and eLearning (ODeL) platform[14] of the University of Port Harcourt stands out among the mapped university e-learning systems. Designed primarily for training professionals across various fields, the platform offers a diverse range of programmes, including undergraduate and graduate degrees, as well as short courses on various specialized topics.

Unlike many institutions that rely on conventional Learning Management Systems, the ODeL platform is fully developed and maintained by the University, providing a customised digital learning environment tailored to its academic and professional training needs. However, the platform currently does not offer any Agricultural Innovation Management and Facilitation courses. Figure 7 shows the assessment results of the platform.

[14] https://odeluniport.com/

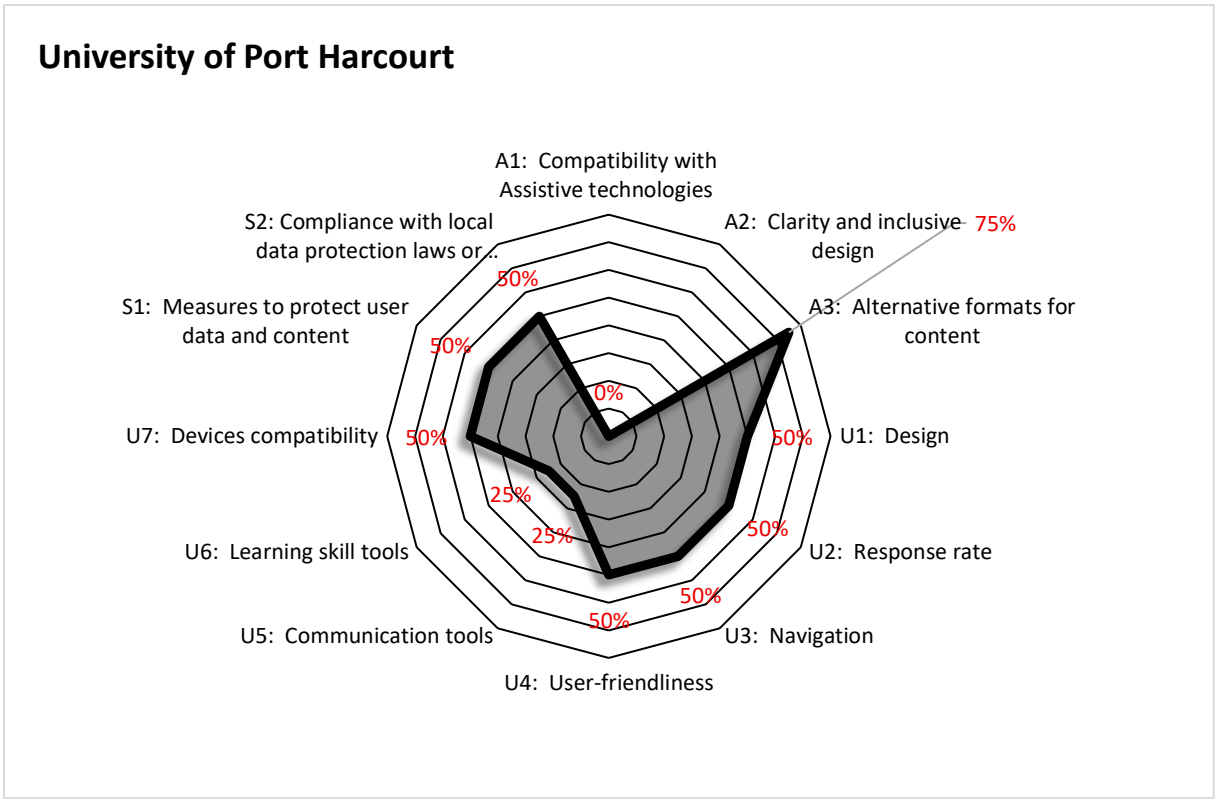


Figure 7: University of Port Harcourt's e-learning platform assessment

Accessibility

The accessibility of the ODeL platform is highly inadequate, creating barriers for students with disabilities and those requiring alternative learning methods. The platform lacks assistive technology support (-), meaning it does not accommodate screen readers, keyboard navigation, or voice commands. This makes it inaccessible for visually impaired users and those with motor disabilities. Similarly, clarity and inclusive design (-) are absent, suggesting that the platform does not incorporate optimised fonts, high-contrast layouts, or adaptable text settings for students with visual impairments or cognitive challenges. The only strong aspect (+++) is the availability of alternative content formats, such as video captions, audio transcripts, and text-based materials, which can help some students with hearing impairments or those in low-bandwidth areas. However, this feature alone does not compensate for the overall lack of inclusive design and assistive technology support.

This assessment suggests that the University of Port Harcourt must urgently enhance accessibility by integrating assistive technology compatibility, improving clarity in design, and ensuring content is adaptable to different learning needs. Without these improvements, the platform remains highly exclusionary, preventing equitable learning for all students.

Usability:

The usability of the platform is moderate, offering basic functionality but lacking essential engagement features. Design (++), response rate (++), and navigation (++) indicate that while the platform is structured adequately, it does not provide the intuitive and engaging experience expected from a modern digital learning environment. User-friendliness (++) suggests that students can navigate the platform, but it may not be optimised for seamless interaction or ease of use for all learners. The device

compatibility (++) rating shows that while students can access the platform on mobile, tablets, and laptops, the experience may not be fully responsive or optimised for all devices.

A major weakness in usability is the lack of communication tools (+), which limits student-instructor interaction. Without discussion forums, Real-time chat, or structured messaging systems, students may struggle with engagement and collaborative learning. Additionally, the platform completely lacks learning skill tools (-) such as SCORM-compliant content, quizzes, assignments, and gamification, which makes the learning process more passive than interactive. This reduces motivation, participation, and overall effectiveness in knowledge retention.

This assessment suggests that while the platform provides basic usability, it does not offer an engaging or interactive learning experience. To improve usability, it must integrate stronger communication tools, interactive learning features, and better mobile optimisation to create a dynamic and student-centred digital learning environment.

Security and Privacy:

The security and privacy measures of the platform are moderate (++), meaning basic protections for user data exist, but they are not robust enough to guarantee full cybersecurity compliance. The platform includes some data encryption and access control, but without strong authentication mechanisms, such as multi-factor authentication (MFA) or end-to-end encryption, there remains a potential risk of unauthorised access or data breaches. Given the increasing cybersecurity threats in digital education, the platform requires advanced security upgrades to safeguard sensitive academic and personal information.

This assessment suggests that while the University of Port Harcourt has implemented basic security/privacy measures, stronger compliance with international data protection laws and advanced encryption mechanisms are necessary. Strengthening security infrastructure and ensuring full regulatory alignment will help protect users and build confidence in the platform's reliability.

5. Lessons learned on the use of e-learning platforms

5.1 Adapting traditional teaching methods for effective e-learning

One of the major challenges that universities have faced in the transition to e-learning has been adapting traditional teaching methods to an online environment. In physical classrooms, teachers and students interact directly, which supports immediate feedback, personalised follow-ups, and adaptive teaching strategies that cater for students' specific needs. However, replicating this level of engagement and connection in an online setting remains a significant challenge for many institutions.

To bridge this gap and build students' confidence, particularly for new graduates, fresh from high school, who may struggle with technophobia, some universities, such as the University of Nkumba, have successfully integrated video-based learning using 'Articulate Rise 360'[15]. Through these videos, the students experience the presence of a teacher, making them feel more connected to the learning process. Additionally, the use of discussion forums has provided an interactive space, within which students can engage with their peers and instructors. This fosters a sense of community and enhances collaborative learning.

5.2 TPACK principles, essential skills for teaching online

For traditional teaching methods to effectively adapt to e-learning, teachers must possess a combination of technological, pedagogical, and content knowledge (TPACK) - a framework developed by Mishra and Koehler (2006). According to this model, content knowledge ensures that instructors are subject-matter experts, who can effectively deliver course content. Pedagogical skills are essential for structuring courses in a way that maximises student comprehension and engagement. Lastly, technological proficiency is critical, as teachers must be digitally literate to design, develop, and manage online courses. In an e-learning environment, in which student-teacher interaction is entirely virtual, mastering digital tools becomes essential for delivering high-quality education. By integrating TPACK principles into teacher training and course development, universities can better equip educators to deliver engaging and effective online learning experiences, ensuring that students receive the same level of quality education as they would in a traditional classroom setting.

5.3 Strengths and limitations of the e-learning approach for the AIMF course

Strengths of e-learning in agriculture-related courses

E-learning has introduced flexibility and accessibility to agricultural education, which allows students to study at their own pace from any location. This is particularly beneficial for learners in remote areas, who might otherwise struggle to access quality education. Additionally, knowledge and staff transfer are greatly enhanced, as experts can share their insights across different regions without physical constraints.

The availability of online resources, including videos, research materials, and interactive content, ensures that students have continuous access to learning materials for better comprehension. Furthermore, collaborative learning is supported through discussion forums and group activities, enabling students to exchange ideas and enhance their understanding. The ability to track student progress also provides teachers with valuable insights into learner engagement, allowing for personalised support and intervention when needed.

[15] Articulate Rise 360 is a cloud-based, rapid e-learning authoring tool within the Articulate 360 subscription suite, optimized for mobile-first, responsive course development

Limitations of e-learning in agriculture-related courses

Despite its benefits, e-learning in agricultural education faces significant challenges. The lack of 'hands-on' training remains one of the biggest limitations, as practical skills, such as fieldwork, laboratory experiments, and farm demonstrations cannot be fully replicated in a virtual setting. Additionally, low adoption rates among students and faculty, coupled with infrequent platform upgrades, hinder the full potential of digital learning.

Poor Internet connectivity, especially in rural areas, further limits student participation. There are also concerns about intellectual property, as digital content can be misused or shared without proper authorization. The absence of clear e-learning policies creates inconsistencies in course delivery and evaluation, while gaps in digital literacy among educators reduce the effectiveness of online teaching.

Furthermore, unclear faculty remuneration policies discourage instructors from fully engaging in digital education. To overcome these barriers, institutions must invest in blended learning models, perform regular platform enhancements, and faculty training, and create and abide by clear policy frameworks to create a more effective and inclusive e-learning environment.

6. Conclusion

This study assessed the potential of e-learning platforms to support Agricultural Innovation Management and Facilitation across African universities. By mapping platforms in RUFORUM member institutions, evaluating their quality, and identifying key drivers and barriers, the research offers valuable insights into the current landscape and prospects of digital learning in agricultural education.

Findings show that the adoption of e-learning is primarily driven by crises, such as the COVID-19 pandemic and political crises, increasing demand for flexible education, supportive institutional policies, governmental initiatives, and technological progress. While e-learning platforms across universities showcase diverse strengths, this diversity presents opportunities for collaboration in the development of AIMF-related courses. For instance, universities such as Kabale and Nkumba, are noted for their accessibility and user-friendly design. Kabale University, in particular, demonstrates expertise in AIMF course design, an asset for future regional collaboration.

Persistent challenges include inadequate ICT infrastructure, unstable electricity supply, high Internet costs, financial constraints, and resistance to digital transformation. Moreover, the limited presence of AIMF-focused courses highlights the urgent need for targeted content development to fully leverage the potential of e-learning in advancing agricultural innovation.

7. Recommendations

Considering the limited number of university e-learning platforms assessed (only four), which was limited mainly due to the reluctance of some institutions to grant access for evaluation, the following recommendations are proposed to support future studies aimed at exploring a broader range of e-learning platforms across African universities.

» **Establish formal collaboration with universities**

A formal letter should be written by the RUFORUM Executive Secretariat to university Vice-Chancellors introducing the study and requesting their support. This will facilitate collaboration between the consultant and universities, ensuring smooth data collection, engagement with stakeholders, and access to relevant institutional resources for a comprehensive assessment of e-learning platforms.

» **Strengthen study planning and outreach strategies**

Greater effort should be put into study planning and strategies to engage potential universities effectively. This includes identifying key decision-makers, leveraging existing networks, and using targeted outreach methods to ensure that universities are willing to participate, provide relevant data, and actively support the study's objectives.

» **Utilise the RUFORUM Conference to map e-Learning platforms**

The RUFORUM conference should be used as a strategic platform to map e-learning platforms across its member universities. This will enable efficient data collection, foster collaboration, and create opportunities for universities to share best practices, challenges, and innovations in digital learning, particularly in Agricultural Innovation Management and Facilitation.

» **Conduct a market analysis on the demand for AIMF courses**

A market analysis should be conducted to assess the demand for AIMF courses among universities and agricultural professionals. Understanding this demand will help convince universities and other partners to participate in the study, design relevant courses, ensure their adoption, and identify potential funding or partnerships to enhance the programme's sustainability.

» **Clearly define AIMF terminology for course categorisation**

A standardized set of terminology should be defined for AIMF to enable platform administrators and teachers to categorize their courses. This will save time during assessments, allowing a direct focus on universities with relevant AIMF content and ensuring a more efficient evaluation process.

» **Highlight the benefits of a collaborative online AIMF course**

A clear list of benefits for universities participating in a collaborative AIMF online course should be developed. This should include advantages, such as shared resources, cost reduction, increased student engagement, improved faculty collaboration, and enhanced visibility of universities in the field of agricultural education.

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ANNEX

A. List of E-learning platforms mapped

N°	Country	University Name	Website	LMS
1	Angola	Agostinho Neto University	https://www.uan.ao/	N/A
2	Angola	University José Eduardo dos Santos	https://ujes.ao/	N/A
3	Benin	Université d'Abomey Calavi	https://uac.bj/	https://elearning.etudiant.bj/
4	Benin	University of Parakou	https://www.univ-parakou.bj/	N/A
5	Benin	Universite' Nationale d'Agriculture	https://www.una.bj/	**Not Publicly available**
6	Botswana	Botswana International University of Science and Technology	https://www.biust.ac.bw/	https://biust.blackboard.com/webapps/login/
7	Botswana	Botswana University of Agriculture and Natural Resources (BUANR)	https://buan.ac.bw/	https://eduhub.buan.ac.bw/course/index.php
8	Burundi	University of Burundi	https://www.ub.edu.bi/	https://moodle.ub.edu.bi/
9	Cameroon	L'Universite De Bamenda	https://uniba.cm/	http://www.unibaonlinelearning.net/
10	Cameroon	Université De Maroua	http://www.univ-maroua.cm/	https://univ-maroua.com/fseg/edu/
11	Cameroon	Institute of Higher Agriculture Education and Management	N/A	N/A
12	Cameroon	University of Beua	https://www.ubuea.cm/	**Not Publicly available**
13	Cameroon	Universite de Dschang	https://www.univ-dschang.org/	**Not Publicly available**
14	Cameroon	Universite of Ngaoundere	https://www.univ-ndere.cm/	**Not Publicly available**
15	Chad	Université de N'Djamena	https://www.universite-ndjamena.td/	**Not Publicly available**
16	Côte d'Ivoire	Université Nangui Abrogoua	https://www.univ-na.ci/	https://foad.uvci.edu.ci/course/index.php
17	Côte d'Ivoire	Universite Felix Houphouet-Boigny	https://w.univ-fhb.edu.ci/	https://foad.uvci.edu.ci/course/index.php
18	Côte d'Ivoire	Institut National Polytechnique	https://www.inphb.ci/	N/A
19	Dem. Rep. of the Congo (DRC)	University of Lubumbashi	https://www.unilu.ac.cd/	https://moodle.unilu.ac.cd/
20	Dem. Rep. of the Congo (DRC)	University of Bunia	http://unibu.org/	N/A
21	Dem. Rep. of the Congo (DRC)	Université Catholique De Bukavu	ucbukavu.ac.cd	N/A
22	Dem. Rep. of the Congo (DRC)	Universite Catholique Du Graben De Butembo	https://www.ucgraben.ac.cd/	N/A

23	Dem. Rep. of the Congo (DRC)	Université de l'Uélé	https://uniuele.ac.cd/	N/A
24	Dem. Rep. of the Congo (DRC)	Universite De Kinshasa	https://www.unikin.ac.cd/	N/A
25	Dem. Rep. of the Congo (DRC)	Universite' de Kisangani	https://ulikis.net/	N/A
26	Dem. Rep. of the Congo (DRC)	Universite Espoir du Congo	https://uec.ac.cd/	N/A
27	Dem. Rep. of the Congo (DRC)	Université Evangelique en Afrique	https://uea.ac.cd/	N/A
28	Dem. Rep. of the Congo (DRC)	Universite' Officielle de Bukavu	https://www.uob.ac.cd/	**Not Publicly available**
29	Egypt	Ain Shams University	https://www.asu.edu.eg/	https://asu2learn.asu.edu.eg/
30	Egypt	Cairo University	https://cu.edu.eg/	https://scholar.cu.edu.eg/
31	Eswatini	University of Eswatini	http://www.uneswa.ac.sz/	https://learn.uneswa.ac.sz/login/index.php
32	Ethiopia	Aksum University	https://aku.edu.et/	N/A
33	Ethiopia	Haramaya University	https://www.haramaya.edu.et/	https://elearning.haramaya.edu.et/
34	Ethiopia	Wollo University	https://wu.edu.et/	https://eopcw.com/
35	Ethiopia	Bahir Dar University	https://www.bdu.edu.et/	https://lms.bdu.edu.et
36	Ethiopia	Jimma University	https://ju.edu.et/	**Not Publicly available**
37	Ethiopia	Mekelle University	https://www.mu.edu.et/	**Not Publicly available**
38	Gambia	University of Gambia	https://www.utg.edu.gm/	https://www.utg.edu.gm/it/online-lectures/
39	Ghana	University of Cape Coast	https://ucc.edu.gh/	https://elearning.ucc.edu.gh/login/index.php
40	Ghana	University of Development Studies	https://www.uds.edu.gh/	https://elearning.uds.edu.gh/
41	Ghana	Cape Coast Technical University	https://cctu.edu.gh/	https://elearning.cctu.online/site/
42	Ghana	University of Energy and Natural Resources	https://uenr.edu.gh/	https://elearning.uenr.edu.gh/login/index.php
43	Ghana	Kwame Nkrumah University of Science and Technology	https://www.knust.edu.gh/	https://myclass.knust.edu.gh/login/index.php
44	Ghana	University of Ghana Legon	https://www.ug.edu.gh/	https://sakai.ug.edu.gh/portal/xlogin
45	Ghana	Takoradi Technical University	https://ttu.edu.gh/	https://vclass.ttu.edu.gh/login/index.php
46	Ghana	University of Education Winneba	https://www.uew.edu.gh/	https://vclass.uew.edu.gh/login/index.php

47	Ghana	Koforidua Technical University	https://www.ktu.edu.gh/	https://vle.ktu.edu.gh/login/index.php
48	Kenya	Karatina University	https://karu.ac.ke/	https://e-learning.karu.ac.ke/
49	Kenya	Jomo Kenyatta University of Agriculture and Technology	https://www.jkuat.ac.ke/	http://sodel3.jkuat.ac.ke/
50	Kenya	Egerton University	https://www.egerton.ac.ke/	https://ecampus.egerton.ac.ke/
51	Kenya	University of Eldoret	https://uoeld.ac.ke/	https://ecampus.uoeld.ac.ke/
52	Kenya	University of Nairobi	https://www.uonbi.ac.ke/	https://eclass.uonbi.ac.ke/
53	Kenya	Embu University, Kenya	https://embuni.ac.ke/	https://e-learning.embuni.ac.ke/
54	Kenya	Maseno University	https://www.maseno.ac.ke/	https://elearning.maseno.ac.ke/
55	Kenya	Masinde Muliro University of Science and Technology	https://www.mmust.ac.ke/	https://elearning.mmust.ac.ke/login/index.php
56	Kenya	Moi University	http://mu.ac.ke/	https://elearning.mu.ac.ke/login/index.php
57	Kenya	South Eastern Kenya University	https://www.seku.ac.ke/	https://e-learning.seku.ac.ke/course/
58	Kenya	Kenyatta University	https://www.ku.ac.ke/	https://kusoma.ku.ac.ke/
59	Kenya	Chuka Uniiversity	https://www.chuka.ac.ke/	https://lms.chuka.ac.ke/
60	Kenya	Tharaka University	https://tharaka.ac.ke/	https://lms.tharaka.ac.ke/
61	Kenya	Pwani University	https://www.pu.ac.ke/	https://soma.pu.ac.ke/
62	Kenya	Jaramongi Odinga Odinga University of Science and Technology	https://www.jooust.ac.ke/	N/A
63	Lesotho	National University of Lesotho	https://nul.ls/	https://thuto.nul.ls/portal
64	Liberia	University of Liberia	https://ul.edu.lr/	https://elearning.ul.edu.lr/login/index.php
65	Madagascar	University of Antananarivo	https://www.univ-antananarivo.mg/	N/A
66	Malawi	Kamuzu University of Health Sciences	https://www.kuhes.ac.mw/	https://compass.medcol.mw/
67	Malawi	Catholic University of Malawi	https://www.cunima.ac.mw/	https://cunima.digital/login/index.php
68	Malawi	Malawi Adventist University	https://mau.ac.mw/	https://eclass.mau.ac.mw/
69	Malawi	Lilongwe University of Agriculture and Natural Resources (LUANAR)	https://www.luanar.ac.mw/	https://elearn.luanar.ac.mw/
70	Malawi	UNICAF University	https://university.unicaf.org/	https://elearning.unicaf.org/
71	Malawi	African Bible College	https://www.africanbiblecolleges.com/	N/A
72	Malawi	Malawi Assemblies of God University	https://www.magu.ac.mw/	**Not Publicly available**
73	Malawi	Malawi University of Business and Applied Sciences	https://www.mubas.ac.mw/	**Not Publicly available**
74	Malawi	Malawi University of Science and Technology	https://www.must.ac.mw/	https://elearning.must.ac.mw/
75	Malawi	Mzuzu University	https://www.mzuni.ac.mw/	**Not Publicly available**
76	Malawi	Nkhoma University	https://www.nkhoma.ac.mw/	**Not Publicly available**
77	Malawi	University of Livingstonia	https://unilia.ac.mw/	**Not Publicly available**
78	Malawi	University of Malawi	https://unima.ac.mw/	**Not Publicly available**
79	Mali	Institut Polytechnique Rural de Formation et de Recherche Appliquée (IPR/IFRA)	https://www.ipr-ifra.edu.ml/	N/A

80	Mauritania	Nouakchott University	https://www.univ-nkc.mr/	N/A
81	Mauritius	University of Mauritius	https://www.uom.ac.mu/	**Not Publicly available**
82	Morocco	Mohammed VI Polytechnic University (UM6P)	https://www.um6p.ma/	https://um6ponline.com/
83	Morocco	Institut agronomique et vétérinaire Hassan II	https://iav.ac.ma/	N/A
84	Mozambique	Universidade Púnguè	https://www.unipungue.ac.mz/	https://cedis.unipungue.ac.mz/
85	Mozambique	Universidade Zambeze	https://unizambeze.ac.mz/	https://ead.unizambeze.ac.mz/
86	Mozambique	Licungo University	https://www.unilicungo.ac.mz/	https://moodle.unilicungo.ac.mz/
87	Mozambique	Universidade Aberta Instituto de Ciências e Educação à Distância (ISCED),	https://unisced.edu.mz/	https://salavirtual.unisced.edu.mz/course/index.php
88	Mozambique	Eduardo Mondlane University	https://uem.mz/	N/A
89	Namibia	International University of Management	https://ium.edu.na/	https://elearn.ium.edu.na/
90	Namibia	University of Namibia	https://www.unam.edu.na/	https://elearning.unam.edu.na/
91	Nigeria	Federal University Dutsin-ma	https://fudutsinma.edu.ng/	https://services.fudutsinma.edu.ng/elearning
92	Nigeria	Nnamdi Azikiwe University	https://unizik.edu.ng/	https://elearn.unizik.edu.ng/login/index.php
93	Nigeria	Federal University of Technology, Akure	https://schools.futa.edu.ng/	https://elearning.futa.edu.ng/
94	Nigeria	University of Nigeria Nsukka	https://www.unn.edu.ng/	https://elearning.unn.edu.ng/
95	Nigeria	Federal University of Technology Owerri	https://futo.edu.ng/	https://lms.futo.edu.ng/login/index.php
96	Nigeria	Federal University of Technology Minna	https://futminna.edu.ng/	https://lmsfut.futminna.edu.ng/
97	Nigeria	Bayero University of Kano	https://www.buk.edu.ng/	https://mybuk4.buk.edu.ng/moodle/
98	Nigeria	University of Port Harcourt	http://www.uniport.edu.ng/	https://odeluniport.com/
99	Nigeria	Federal University of Agriculture Abeokuta	https://funaab.edu.ng/	https://onboarding.unaab.edu.ng/index.php
100	Republic of the Congo	Masuku University of Science and Technology	https://univ-masuku.org/	N/A
101	Republic of the Congo	Universtite Marien Ngouabi	https://www.umng-flash.com/	**Not Publicly available**
102	Rwanda	University of Rwanda	https://ur.ac.rw/	https://ur.ac.rw/?eLearning-Platform
103	Rwanda	University of Kibungo	https://www.unik.ac.rw/	N/A
104	Senegal	Universite Cheikh Anta Diop de Dakar	https://www.ucad.sn/	https://fad.ucad.sn/login/index.php
105	Senegal	Université Sine Saloum El hadj Ibrahima NIASS (USSEIN)	https://www.ussein.sn/	https://ussein.unchk.sn/
106	Sierra Leone	Njala University	https://njala.edu.sl/	https://portal.njala.edu.sl/login/index.php
107	Somalia	Somalia National University	https://nugaaluniversity.edu.so/	N/A
108	Somalia	City University of Mogadishu	https://cu.edu.so/	**Not Publicly available**
109	Somalia	Nugaal University	https://nugaaldatabase.com/	**Not Publicly available**
110	Somalia	Zamzam University of Science and Technology	https://zust.edu.so/	**Not Publicly available**
111	South Africa	University of Pretoria	https://www.up.ac.za/	https://clickup.up.ac.za/

112	South Africa	University of Western Cape	https://www.uwc.ac.za/	https://ikamva.uwc.ac.za/portal/login
113	South Africa	Stellenbosch University	http://www.sun.ac.za/	https://learn.sun.ac.za/
114	South Africa	University of Fort Hare	https://www.ufh.ac.za/	https://learn.ufh.ac.za/
115	South Africa	University of Kwazulu Natal	https://ukzn.ac.za/	https://learn2024.ukzn.ac.za/
116	South Africa	University of South Africa (UNISA)	https://www.unisa.ac.za/	https://mymodules.dtls.unisa.ac.za/login/index.php
117	South Africa	University of Mpumalanga	http://www.ump.ac.za/	https://myump.ump.ac.za/login/index.php
118	South Africa	University of Venda	https://www.univen.ac.za/	https://myuniven-moodle.univen.ac.za/local/login/index.php
119	South Africa	University of Limpopo	https://www.ul.ac.za/	https://tmlearn.ul.ac.za/
120	South Africa	University of Free State	https://www.ufs.ac.za/	https://ufs.blackboard.com/
121	South Sudan	Catholic University of South Sudan	https://www.cuofssd.org/	N/A
122	South Sudan	Upper Nile University	https://unu.edu.ss/	N/A
123	South Sudan	John Garang University	https://drjgmu.edu.ss/	**Not Publicly available**
124	South Sudan	University of Juba	https://uoj.edu.ss/	**Not Publicly available**
125	Sudan	Peace University	https://upeace.org/	https://classroom.upeace.org/elearning/
126	Sudan	Sudan University of Science and Technology	https://www.sustech.edu/	https://el.sustech.edu/login/index.php
127	Sudan	University of Khartoum	https://www.uofk.edu/	https://lms.uofk.edu/
128	Sudan	International University of Africa	https://www.iua.edu.sd/	N/A
129	Sudan	University of Dongola	https://www.uofd.edu.sd/	N/A
130	Sudan	University of Gadarif	https://gaduniv.edu.sd/	N/A
131	Sudan	University of Gezira	https://uofg.edu.sd/	N/A
132	Sudan	University of Kordofan	https://www.kordofan.edu.sd/	N/A
133	Sudan	West Kordufan University	https://wku.edu.sd/	N/A
134	Tanzania	Sokoine University of Agriculture and Technology	https://www.sua.ac.tz/	http://197.250.34.58/itcbmoodle/
135	Tanzania	University of Dar-ES-Salaam	https://www.udsm.ac.tz/	https://lms.udsm.ac.tz/login/index.php
136	Tanzania	Nelson Mandela Africa Institute of Science and Technology	https://nm-aist.ac.tz/	https://elearning.nm-aist.ac.tz/login/index.php
137	Togo	University of Lome	https://univ-lome.tg/	https://elearn.univ-lome.tg:8181/login/index.php
138	Tunisia	Virtual University of Tunisia	https://www.uvt.rnu.tn/	http://rel.uvt.rnu.tn/
139	Uganda	Gulu University	https://gu.ac.ug/	https://guele.gu.ac.ug/login/index.php
140	Uganda	Kabale University	https://www.kab.ac.ug/	http://elearning.kab.ac.ug
141	Uganda	Busitema University	https://busitema.ac.ug/	http://lms.busitema.ac.ug/
142	Uganda	Kampala International University	https://kiu.ac.ug/	https://elearn.kiu.ac.ug/
143	Uganda	Kampala University	https://www.ku.ac.ug/	https://elearn.ku.ac.ug/
144	Uganda	Bugema University	https://www.bugemauniv.ac.ug/	https://elearning.bugemauniv.ac.ug/
145	Uganda	Mbarara University of Science and Technology	https://www.must.ac.ug/	https://elearning.must.ac.ug/

146	Uganda	Nkumba University	https://nkumbauniversity.ac.ug/	https://elearning.nkumbauniversity.ac.ug/
147	Uganda	Uganda Martyrs University	https://umu.ac.ug/	https://elearning.umu.ac.ug/
148	Uganda	Uganda Technology and Mangement University	https://utamu.ac.ug/	https://elearning.utamu.ac.ug/
149	Uganda	Kyambogo University	https://kyu.ac.ug/	https://kelms.kyu.ac.ug/
150	Uganda	Uganda Christian University	https://ucu.ac.ug/	https://moodle.ucu.ac.ug/
151	Uganda	Makerere University	https://mak.ac.ug/	https://muele.mak.ac.ug/
152	Uganda	Muni University	http://muni.ac.ug/	https://muele.muni.ac.ug/
153	Uganda	Ndejje University	https://ndejjeuniversity.ac.ug/	https://nduels.ndu.ac.ug/
154	Uganda	Bishop Stuart University	https://www.bsu.ac.ug/	https://vle.bsu.ac.ug/
155	Uganda	Islamic University in Uganda (IUIU)	https://www.iuiu.ac.ug/	N/A
156	Uganda	Mountains of the Moon University	https://mmu.ac.ug/	https://elearning.mmu.ac.ug/
157	Uganda	Soroti University	https://sun.ac.ug/	https://lms.sun.ac.ug/login/index.php
158	Zambia	Kapasa Makasa University	https://www.kmu.ac.zm/	https://elearning.kmu.ac.zm/
159	Zambia	Mulungushi University	https://www.mu.ac.zm /	https://moodle.mu.ac.zm/moodle/
160	Zambia	University of Zambia	https://www.unza.zm/	https://moodle.unza.zm/login/index.php
161	Zambia	Copperbelt University	https://www.cbu.ac.zm/	https://www.cbu.ac.zm/opus/moodle/
162	Zimbabwe	Chinhoyi University of Technology	https://www.cut.ac.zw/	https://elearning.cut.ac.zw/portal/index.php/portal/login
163	Zimbabwe	Lupane State University	http://www.lsu.ac.zw/	https://elearning.lsu.ac.zw/elearning/
164	Zimbabwe	Midlands State University	https://ww5.msu.ac.zw/	https://elearning.msu.ac.zw/
165	Zimbabwe	Bindura University of Science Education	https://www.buse.ac.zw/	https://mybuse.buse.ac.zw
166	Zimbabwe	Africa University	https://africau.edu/	https://online.africau.edu/
167	Zimbabwe	University of Zimbabwe	https://www.uz.ac.zw/	https://www.uz.ac.zw/index.php/lms
168	Zimbabwe	Great Zimbabwe University	https://www.gzu.ac.zw/	N/A
169	Zimbabwe	Marondera University of Agricultural Sciences and Technology	https://muast.ac.zw/	**Not Publicly available**
170	Zimbabwe	Women's University in Africa	https://www.wua.ac.zw/	https://myhope.wua.ac.zw/login/index.php

Legend: N/A: Not Available

B. Survey

ASSESSMENT OF THE QUALITY OF THE E-LEARNING PLATFORM AND CONTENT ON AGRICULTURAL INNOVATION MANAGEMENT AND FACILITATION (AIMF)

This survey is intended to assess the quality of the University's e-learning platform and content on the Agricultural Innovation Management and Facilitation. This assessment will help to evaluate the potential of African university e-learning platforms to support students and professionals in Innovation Management and Innovation Facilitation within the Agricultural sector in Africa. You will share your insights on specific aspects of the e-learning platform and content, such as platform accessibility, usability and security, privacy, content quality, and relevance on AIMF.

Section 1: About the respondent

1.1 What is your name?
1.2 What is the name of your university?
- University A
- University B
- University C
- University D
- University E
- University F
- University G
- University H
- University I
- University J

1.3 What is your position at the university?

☐ Student ☐ Professional ☐ Teacher ☐ Platform Administrator ☐ Faculty Staff

1.4 If you are a student or professional pursuing a certificate, which online course are you taking at your university?

- Agricultural Innovation Management and Facilitation
- Agricultural Knowledge and Information Systems
- Agronomy
- Innovation management,
- AIMF project management,
- Managing for impacts;
- Facilitating multi-actor innovation processes;
-Other (please specify)

Section 2: About the e-learning platform assessment

- ***Platform accessibility***

2.1 Which accessibility features are available on the platform?
- ✓ ☐ Screen readers ☐ Keyboard navigation ☐ Voice commands ☐ None

2.2 The fonts, colours, and layouts are designed to be easily readable and accessible for visually impaired users
- Strongly agree - Agree - Neutral – Disagree - Strongly disagree

2.3 The platform provides captions for videos, transcripts for audio, and text alternatives for images.
- Strongly agree - Agree - Neutral – Disagree - Strongly disagree

- ***Platform usability***

3.1 Does the platform have an appealing design that captures and maintains user attention?
☐ Yes ☐ No

3.2 How quickly does the platform load request content for users?
☐ Instantly ☐Within a few seconds ☐Takes noticeable time ☐ Slow

3.3 It is easy to navigate the platform and locate relevant information without excessive search time.
- Strongly agree - Agree - Neutral – Disagree - Strongly disagree

3.4 Rate how simple the platform is to use and understand (1 = Not simple at all, 10 = Very simple)
(Scale from 1 to 10)

3.5 What types of tools does the platform provide for interaction? (Select all that apply)

- Chat
- Forums
- Email
- None

3.6 The platform includes interactive features such as SCORM compliance, quizzes, gamification, and other learning tools.
- Strongly agree - Agree - Neutral – Disagree - Strongly disagree

3.7 How would you describe the platform's accessibility on various devices?
☐ Excellent, ☐ Good, ☐ Fair, ☐ Poor, ☐ Very Poor)

- ***Content quality and relevance***

3.8 Does the platform include content directly related to agricultural innovation topics, such as Agricultural Innovation Management and Facilitations?
☐ Yes ☐ No

3.9 Is the content credible, clear, and concise, ensuring that learning objectives are met effectively?

- Very clear and concise
- Clear
- Neutral
- Slightly unclear
- Very unclear

3.10 Is the material accurate and comprehensive?
☐ Yes ☐ No
If yes, does it include assessments like quizzes or exams?
☐ Yes ☐ No

3.11 Is the content regularly updated to remain current and engaging for users?
From 1 to 10 Where 1 is Never updated and 10 is Frequently updated

Security and data privacy

3.12 Does the platform require a password or other methods to confirm your identity before accessing your account?
☐ Yes ☐ No

3.13 Do you feel your personal information is safe when using the platform?
☐ Yes ☐ No

Section 4: About lessons learned

4.1. What are your main barriers while using the e-learning platform? (Select all that apply)

☐ Internet access issues

☐ Content gaps or lack of relevance

☐ Platform usability or navigation challenges

☐ Lack of interactive features

☐ Insufficient support or feedback from instructors

☐ Other (please specify): _____

4.2 To what extent do you agree that the platform content meets the needs of AIMF Master's Degree programmes and enhances your professional innovation management skills?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

4.3 How frequently does using the e-learning platform support your attainment of university credits and improve your professional skills?

- Always
- Often
- Sometimes
- Rarely
- Never

c. Interview guide

USE AND POTENTIAL OF E-LEARNING PLATFORMS TO SUPPORT THE ATTAINMENT OF UNIVERSITY CREDITS IN MASTER'S DEGREE PROGRAMMES/SHORT COURSES ON AGRICULTURAL INNOVATION MANAGEMENT AND FACILITATION

This interview guide is intended to consolidate lessons learned on the use and potential of e-learning platforms to support the attainment of university credits in Master's Degree programs on Agricultural Innovation Management and Facilitation

N°	Interview questions	E-learning platform administrator	Trainers (Teachers)/ Content Developers
1	What are the key drivers and main challenges you encountered in developing and maintaining an AIMF-focused platform?	✅	
2	How has the platform been integrated into University curricula, and how well does it align with AIMF Master's Degree programmes?	✅	✅
3	What opportunities do you see for sharing resources and collaborating with other universities or platforms?	✅	✅
4	What measures have been implemented to ensure data protection and privacy for users?	✅	
5	What accessibility features does the platform offer to support users with disabilities or those with limited connectivity?	✅	
6	What specific challenges have you faced in developing or delivering digital learning materials for AIMF programmes?		✅
7	How have you adapted traditional teaching methods for effective use on the platform? What challenges did you encounter?		✅
8	In your view, what are the main strengths and limitations of the e-learning approach for AIMF education?	✅	✅
9	What feedback have you received on the platform's usability, accessibility, and its integration with existing curricula? How has this feedback influenced improvements?	✅	✅

Contact

Website:
www.desiralift.org

LinkedIn:
www.linkedin.com/company/desira-lift

Address:
Wageningen Social and Economic Research
P.O. Box 88
6700 AB Wageningen
The Netherlands

Email:
info@desiralift.org

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