Impact of COVID-19 on land administration and surveying education: online education, teaching innovations, challenges and future implications - experiences from eight universities Africa

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Key words: land administration education; online education; covid-19 lockdown

SUMMARY

The purpose of universities is to train skilled individuals who can work in various sectors related to land administration, such as government agencies, land management organizations, surveying and mapping firms, consulting firms or other. Universities play a crucial role in land administration by offering professional development programs that teach theoretical knowledge, practical skills, and critical thinking abilities. These programs aim to support land reforms and contribute to the establishment of an efficient and sustainable land administration system. Accordingly, university curricula typically combine theoretical knowledge with practical training, allowing students to develop the necessary skills to work in the field. In 2020, the Covid-19 pandemic led to a significant disruption in the traditional face to face methods of teaching for both theory and practical subjects, prompting sudden shift online education as an alternative mode of instruction, globally. This sudden transformation to online education was experienced differently across the globe. For example, the digital divide in Eastern Africa implied different coping strategies to ensure continuity of education during the lockdown. This study provides experiences, insights into the benefits and challenges faced by educators of eight universities teaching land administration related courses - across eight countries in Africa. This paper emphasises on the strategies implemented to ensure education continuity during the lockdown and emphasize their success, challenges, and future directions that extend beyond the pandemic. This study has implications on the effectiveness of online education on teaching of both theory and practical subjects in land administration related courses.

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1. INTRODUCTION

Land administration is the process of managing and regulating the use, ownership, and transfer of land when implementing land management policies (UNECE, 1996). Activities and functions of land administration relate to land governance, land registration, land surveying, land valuation, land use planning, land development and land information management. As such, land administration refers to the systems, processes, and institutions that govern or support effective management of land through its functions of land tenure, land use, land value and land development as well as land information management. Land administration systems are put in place by governments to ensure efficient and effective management of land resources. For this to be achieved, specialized skills and expertise to address the legal, institutional, and technical aspects of land administration are necessary.

Higher education institutions play a crucial role in the functioning of the land administration system through provision of the necessary knowledge, skills, and expertise needed to effectively manage and administer land resources. In this sense, universities contribute to land administration through professional development, where knowledge relating to theoretical foundations, practical skills, and critical thinking abilities e.g. to support land reforms - in support of an effective and sustainable land administration system are taught (Lengoiboni *et al.*; 2021).

Universities educate and prepare competent professionals who are absorbed in the workforce where they create value as employees of government agencies, land management organizations, surveying and mapping firms, consulting firms, and other land administration related sectors. Some of the professionals turn into entrepreneurs who establishes demand driven small firms with potential to scale up and create jobs. Due to multifaceted nature of land administration, programs taught at universities range to include land related laws and policies, land surveying, land registration, land valuation, land use planning, and land information management constitute education programs taught at universities. Accordingly, university curricula typically combine theoretical knowledge with practical training, allowing students to develop the necessary skills to work in the field. Both at graduate and undergraduate levels, education systems teach subjects covering legal and policy frameworks in theory – usually using traditional/conventional teaching approaches. Mapping/surveying and other land information management systems require technical teaching approaches and applications and lessons typically consist of fieldwork and laboratory exercises, where students engage with

various surveying instruments and equipment such as total stations, GPS receivers, and levelling instruments, or even more modern equipment such as UAVs, mapping using mobile phones, etc. These mapping techniques relate to marking land boundaries, conducting topographic surveys, and creating maps and plans, among others. Visualization of spatial information aids informed decision making on matters concerning land tenure, land use planning, land markets and land development (Williamson *et al.,* 2010).

In 2020, the Covid-19 pandemic led to a significant disruption in the traditional methods of teaching of both theory and practical subjects prompting sudden shift to online education as an alternative mode of instruction, globally. This sudden shift has raised questions about the impact of online education on teaching during the lockdown period.

This paper provides experiences, insights into the benefits and challenges faced by both educators and students at different member universities of the Eastern Africa Land Administration Network (EALAN), or members of the 'Network of Excellence on Land Governance in Africa' (NELGA) as a response to the COVID-19 pandemic. The paper highlights success, challenges, and suggests future directions that extend beyond the pandemic. Interventions from these institutions are discussed.

2. METHODOLOGY

The paper used qualitative research approach to gather the experiences of universities teaching land administration related courses during the COVID-19 pandemic. Representatives from eight universities across eight countries (see Table 1) responded to open ended questions. These representatives are academic staff who teach the land administration related courses – both theory and practice at their specific universities. The representatives were invited to conduct a mini-study at their departments on the new educational interventions implemented by their institutions in response to the COVID-19 pandemic, and the experiences faced by both educators and students in the applications of these alternative interventions. Most of the respondents have more than 20 years of teaching experience (see Table 2).

Data collection took place between August and November 2023, and the mini-study conducted by the representatives of the eight universities sought to gather the following information:

i) Platform used to ensure continuity of education during the pandemic;
ii) Teacher preparedness for online teaching at the onset of the pandemic;
iii) Student preparedness on the onset of the pandemic;
iv) Student population and management of class sizes during online education;
v) Duration of the online teaching during the pandemic;
vi) Positive elements brought by online teaching (for theory lessons);
vii) Positive elements brought by online teaching (for practical lessons);
viii) Challenges faced when implementing online education (for theory lessons);
ix) Challenges faced when implementing online education (for practical lessons);
x) Innovations in teaching;
xi) Innovations in learning as seen by students;
xii) Future directions of online education beyond covid.

Qualitative synthesis allows pooling findings of qualitative studies (Bearman, 2013). A qualitative synthesis method allows for the examination of existing literature and the review

and integration of primary research studies focusing on a particular question or phenomenon. This approach uncovers more profound insights and explanations that cannot be achieved through a single study alone (Erwin, 2011). As such, meta-synthesis was used to pool together the outcomes of the mini-studies from the eight universities, where all concepts across studies were identified and synthesized to generate overarching findings or themes. Schreiber *et al* (1997) define meta-synthesis as "the aggregating of a group of studies for the purpose of discovering the essential elements and translating the results into the end product that transforms the original results into a new conceptualization". Meta-synthesis typically follows a rigorous and systematic approach, involving several stages:

i) **Identification and selection of studies**: in this case, mini-studies from the eight universities were compiled using the guiding questions.
ii) **Data extraction**: Key information from each selected study is extracted and organized in a systematic manner. In this study, responses and detail of findings on each guiding question was compiled in preparation for analysis.
iii) **Coding and analysis**: common themes are merged, and new concepts across the studies are identified and synthesized to generate overarching findings.
iv) **Interpretation and synthesis:** The synthesized findings are interpreted in relation to the research question or objective. Connections between themes and sub-themes are explored, and explanations or theories are developed to explain the collective findings.

In this sense, a meta-synthesis is appropriate for this study as it allows us to gather knowledge from individual studies, enabling us to apply the information obtained from these studies in an online education setting in relation to land administration related education – or beyond. Meta-aggregation seeks to enable generalizable statements in the form of recommendations to guide practitioners and policy makers (Hannes & Lockwood, 2011).

Table 1: Overview of land administration related programs by responding institutions

University		Land Administration related program at the university	Network
1	*Université Evangélique en Afrique* (UEA) from **Democratic Republic of Congo**	Short courses for practitioners on land surveying and land use planning. Short courses on GIS and remote sensing GIS and remote sensing courses for BSc students enrolled in environment Department	- EALAN - *EARN
2	University of Nairobi (UoN) from **Kenya**	BSc degrees: courses by the Royal Institution of Chartered Surveyors (RICS) in *Land and Quantity Surveying* began in 1961; Land administration, which encompasses land surveying (now geomatics/geospatial engineering), land tenure, land valuation, land use planning and land development is offered as stand-alone degree programs.	- EALAN - *EARN
3	*Institut d'Enseignement Supérieur de Ruhengeri* (INES) from **Rwanda**	Department of Land Administration and Management, and the Department of Land Survey hosts undergraduate programs.	- EALAN - *EARN

4	Bahir Dar University (BDU) from **Ethiopia**	The Institute of Land Administration (ILA) hosts various undergraduate (BSc level), post graduate (MSc/MA and PhD) programs, and admitting students from all over the country and abroad (mainly from other African countries).	- EALAN - *EARN
5	University of Juba (UoJ) from **South Sudan**	The School of Architecture, Land Management, Urban and Regional Planning is hosts the land management programme	- EALAN - *EARN
6	Ardi University (AU)from **Tanzania**	The university offers a range of land-based programs under one roof including geomatics, geoinformatics, GIS and remote sensing, land management and valuation, urban and rural planning and real estate.	- EALAN - *EARN
7	University of Burundi (UB) from **Burundi**	The Institute of Land Administration and Surveying (*Institut d'Administration et Cartographie Foncière*) of the University of Burundi hosts undergraduate programmes in land administration and surveying, land use planning, land use planning and urban planning.	- EALAN - *EARN
8	Namibia University of Science and Technology (NUST) from **Namibia**	BSc and masters' programs are hosted at the Department of Land and Spatial Sciences.	- **SARN

* NELGA's East Africa Regional Node
** NELGA's Southern Africa Regional Node

Table 2: Respondents years of experience in teaching

Years of teaching experience	UEA	UoN	INES	BDU	UoJ	AU	UB	NUST
1-5								**x**
6-10			**x**					
11-15					**x**			
16-20		**x**						
21-25				**x**			**x**	
26-30								
>30	**x**					**x**		

3. Results and discussions

This section presents the results collected by the eight universities, which provided information on the teaching approach during the COVID-19 pandemic. The results are organised following the twelve points to be answered during the mini-study conducted by the representative of each participating universities.

3.1.Platforms used to ensure continuity of education during the lockdown

There was a need for innovation as response to the pandemic's disruption of the education system (Uwizeyimana, 2021) and multiple initiatives were used across the eight countries. The

approaches range from virtual classrooms, distance learning and an instance where traditional face to face instruction approaches maintained as the country did not go on lockdown. For virtual classrooms, instructors and students took place through a variety of online platforms (see Table 3: platforms 1-7).

Table 3: Platforms used to ensure continuation of education during the lockdown

Platform	UEA	UoN	INES	BDU	UoJ	AU	UB	NUST
1. Zoom	**x**		**x**	**x**		**x**		
2. Moodle system		**x**	**x**					**x**
3. Microsoft Teams		**x**		**x**				**x**
4. Google Meet		**x**				**x**		
5. Google classroom		**x**						
6. Email	**x**							
7. Whatsapp groups	**x**							
8. Distance Learning					**x**			
9. Live teaching (no lockdown)							**x**	

Table 3 shows that open-source platforms i.e. Zoom and Moodle systems were most popular for virtual education. Microsoft Teams was also used across three universities. Free services from Google i.e. Google meet and Google classroom were also instrumental in ensuring continuity of education. WhatsApp groups composed of students, and emails are explicitly stated by the UEA – as being instrumental for sharing resources, assignments, and communicate with students. On Distance Education, UoJ resorted to distance learning (paper based) due to challenges in internet and electricity connections. As such, printed materials, including exams were undertaken at distance and students delivered their work to school as mandated. There was no lockdown in Burundi, and as such the UB maintained the traditional face to face teaching while adopting the covid-19 precautions. Although there was no lockdown in Burundi, it is the foreign professors and students who were in the country as visiting staff or for data collection that were affected due to the lockdown in their home countries. This was amplified by travel shutdown as they could not return to their countries. For these visiting staff and students, ICT and virtual classes were adopted as an alternative for those stuck in Burundi so they could join activities with their affiliated institutions abroad.

3.2.Teacher preparedness for online teaching at the onset of the pandemic

Of the six universities that implemented virtual teaching and learning approaches, the sudden shift to available alternatives were met by surprise, especially because the land administration and surveying programs requires the use of both face-to-face teaching either in the classrooms, or in the computer labs for and out in the field for practical lessons. The ability to effectively deliver education was hindered by several limitations - especially at the beginning of the pandemic – as in the case of UoN, where the transition to a different reality occurred at the

onset of the exams period. The following limitations were observed in terms of teacher preparedness for virtual education across the six universities:

- Inadequate or lack of ICT divides, or appropriate devices by teachers and by a large proportion of students. This was even more difficult with large classes as such devices were limited inside and outside the university;
- Lack of and exposure, experience or and skills to navigate online teaching platforms; and lack of training on how to carry out online education. The combination of the need to adapt quickly to technology, and inadequate training meant that some struggled to use digital tools effectively, thereby effective delivery of education. All universities implementing virtual education indicated support by the university administration to provide training sessions for staff. In the case of DRC, the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) and other networks played a crucial role in facilitating knowledge sharing and collaboration among educators, allowing them to learn from each other's experiences and best practices. UoN for example put up eLearning platforms for both teachers and students. Such trainings for teachers included Moodle, Online examination platforms and tools etc.;
- Limited access to stable internet connections; or limited access to the internet when outside the university;
- Absence of regulations to guide online teaching and learning.

The observed limitations of teacher preparedness have implications on the efficiency of delivery or the courses, as well as on the student learning process and experiences – as will be outlined in the next sections. This is in line with Ngabonzima (2020) and Mugiraneza (2021), who observed that the sudden shift to e-learning environment required teachers to adapt quickly to new technology, while lack of prior experience and inadequate training meant that some struggled to use digital tools, which in turn influences effective delivery of education.

3.3.Student preparedness on the onset of the pandemic

Students also were hindered to effectively participate in virtual classrooms and associated activities. The UoN explicitly reports training students on the use of various digital – eclass (based on moodle), google classroom, and google meet and Microsoft Teams to enable them participate in online education. It was however observed that class attendance remained dismal and even the concentrations. In these circumstances, lectures were trained on the Asynchronous learning (using both real-time) tools to improve on class attendance. In this sense the face-to-face teaching continued to some degree to enhance class attendance and learning. On the other hand, the following feature in terms of student preparedness to participate in virtual education across the participating institutions, hindered engagement and motivation as it restricted learners from learning:

i) Access to ICT devices:

- Many students lacked the necessary digital literacy skills, leading to frustration and disengagement.
- Digital divide – it was observed that students in the urban areas had better chances of access to technology than those in the rural areas.

- Many students, particularly those in rural areas, faced barriers to accessing digital technology such as computers and smartphones.
- High costs associated with digital devices.

ii) Unreliable internet:

- Unreliable internet connections interfere with both lesson delivery or content access. Meanwhile, many students did not have internet access devices, which caused delays in submissions of assessments.
- however, it was established that the teaching largely continued in the traditional class room lecturer - teacher-directed live stream learning. Because of internet connectivity challenges for both the lectures and the students.

iii) Electricity challenges;

iv) Financially burdensome: costs associated with purchase of internet data

v) Lack of in-person interactions: The absence of in-person interactions and collaborative learning experiences negatively impacted the overall educational experience

Just as their teachers, access to digital devices (and digital literacy for students), internet and electricity challengers feature as challenges faced by students. Moreover, costs associated with internet data purchases by students introduce extra financial burden – as to participate on online classes required purchase of internet data, most likely covered by students themselves.
Hence, it was a real fact that students' preparedness for online courses in BDU Institute of Land Administration was very low. According to the study conducted by Adams et al. (2022), the concerns on the preparedness of the students for online learning depends on different factors such as students' gender, age, ethnicity, level of education, field of study and familiarity with the online platforms. Similar concern has been observed by Belay (2020). In Rwanda, Nsengimana et al. (2021) observed that many students, particularly those in rural areas, faced barriers to accessing digital technology such as computers and smartphones, while internet and electricity connections lacked. Meanwhile, limited previous experience of using online platforms for learning were the two key factors affecting the readiness of the students for online learning. These instances raise questions on the effectiveness of online platforms to deliver land administration related courses – both theory and practice.

3.4.Student population and management of class sizes during online education

Class sizes across the programs – BSc, MSc or PhD vary across the universities. The BSc class sizes average can consist of between 100 to over 200 students - as in the case of UoN, INES, AU, and the UB. MSc class sizes are less compared to the BSc class sizes, constituting of an average of 30 students – as in the case of NUST and TLU. While PhD programs exist at AU and BDU, their student numbers are not indicated.

Virtual learning environments were capable of handling large class sizes. The lack of - or insufficient technology, unreliable internet services, unreliable electricity and related challenges compelled some of the universities to make adjustments to accommodate the available technology infrastructure in order to enhance delivery of education. In 2020 – as in the case of INES, the Level 3 Land Administration Department had two sections, A and B, with 78 students in section A and 75 students in section B. These sections were further divided into smaller sections to enable teachers to effectively manage online classes. In the case of UoN, Nyaega's study (2022) on the impact of the Corona Virus Pandemic on online learning adoption among UoN undergraduate students found that out of 232 respondents, 46.98% unaware of online learning, 14.66% finding it impossible, 19.40% deemed it unsuitable for examinations, and 18.96% preferring face-to-face teaching – and that class attendance (online) consistently remained below 50%. Subsequently lecturers at the UoN were tasked extra work to provide additional support to students who struggled to keep up with online classes by adopting asynchronous learning (using both real-time) tools as coping strategy, and to improve on class attendance. In this sense, the traditional face to face teaching continued (in some degree) as coping strategy and to support student learning, and to ensure all students are on the same page.

After the pandemic, the traditional face to face learning has resumed in land administration education particularly for undergraduate programs across the eight universities. The online academic services remained mainly for thesis supervision and defences for postgraduate students (Bishaw *et al.,* 2022). In the case of BDU, online teaching and supervision services received wide acceptance by the PhD students and the Zoom platform is still largely used by supervisors and PhD students.

3.5.Duration of the online education during the pandemic

Duration of the lockdown vary across the participating institutions. From no lockdown in Burundi, to a one-month lockdown by the UEA in DRC, to a semester at AU. Regardless of the lockdown length, the experiences of online teaching prompted reflections across the institutions of higher learning, taking experiences and lessons learned as key issues of focus. A reflection on the role of online education and how to ensure equitable access and quality in a digital learning environment became quite important, as in the case of the UoN and UEA. As such, even after the pandemic, the UoN organized a further online training workshop for the members of the academic staff on transformative pedagogy in higher education with special reference to asynchronous e-learning mode of delivery, which allows learners to learn at their own schedule, within a certain timeframe by accessing and completing lectures, readings, homework and other learning materials within the timeframe. In the case of AU, online consultation continued beyond the lockdown (for more than a year) to cater for foreign students from Rwanda and Malawi who could not come back to Tanzania due to lock down in their countries. In the case of NUST, some courses remain online as a legacy of the onset of the pandemic. In all, while the length of implementing the online education matched the lockdown period – and despite the barriers and loopholes associated with its implementation during the pandemic, online education appears to have gained prominence as evidenced by the fact that some universities have sustained the online education in two forms: i) to complement the

existing face to face education – as blended education, or ii) to maintain as online education even post the pandemic.

3.6.Positive elements brought by online teaching: theory lessons

Online education also brought about positive elements. Varied experiences and lessons learned from the crises experienced from multiple angles in turn equipped both teachers and students with new insights and skills, which have the potential to shape the future of education at the universities. In line with this observation, the following feature as the perceived positive elements brought by online teaching across the responding institutions:

- Acceptance and adoption of ICT technology as an alternative to the conventional face-to-face classes and meetings, making digital learning a necessary resource – not only for teaching, but also for instructors to attend meetings and training beyond their local universities. As such, trips by teachers to attend seminars across the country or abroad have been reduced.
- Exposure to diverse learning resources where by a series of applications, platforms and educational resources have been launched at some universities to support distance or online education.
- It made it possible for the lecturers (facilitators) to easily share learning materials;
- A central portal for access to learning materials as many times as necessary, and simultaneously. Such has brought about flexibility as students can learn at their own pace, from anywhere.
- Recording of attendance, hence easier to track the level of class attendance
- Tracking progress on assignments
- Improved communication, and innovative teaching methods
- Limitations due to physical attendance was eliminated e.g. commuting time due to traffic jams lessened

Despite the limitations stated earlier e.g. lack of devices, unreliable internet and electricity, slow uptake, etc. (see section 3.3), it is clear that there are advantages brought about by the virtual teaching and learning environment – for both teachers and students. Online education has introduced an alternative means of educational instruction. Exposure to diverse learning resources characterised by flexibility, accessibility of information and the ability to simultaneously access, use, and monitor both teacher and student activities – unconstrained by location and time introduced new possibilities regarding online education. As empirical evidence shows, COVID-19 has become a triggering or motivating factor for university management and teachers to consider ICT technology as an alternative to the conventional face-to-face classes and meetings (Svihus, 2023).

3.7.Positive elements brought by online teaching: practical lessons

The outbreak of COVID-19 and the resulting transition to online learning changed the thinking around the mode of teaching at the Department, University and National levels. While teaching the theory online was quite possible during the pandemic, it was a different case for the practical teaching. Not much could be done during the pandemic. INES and UoJ could not

conduct the practical teaching as they were suspended in the same way as the face-to-face lecturing. The practical sessions had to wait for physical class to resume. In Kenya, there was efforts to refer students to already existing online video for practical demonstration and physical sessions were scheduled when some groups of students could alternatively attend the lessons.

3.8.Challenges faced when implementing online education: theory lessons

Challenges were many in the implementation of online teaching. Both students and lecturers were not ready if not prepared for this teaching approach.

- The online teaching reduced the opportunity for learners to learn from one another; and thus, a remarkable low performance for classes that were exclusively online (i.e. the use of artificial intelligence like chatGPT for examinations).
- As stated before, the absence of or weak reliable ICT infrastructure (computers, smart phone, internet, electricity etc.) coupled with the lack of online teaching experience, on-site support for use of technology, time to successfully integrate the use of technological tools and lack of financial support. More importantly, teachers and students were not accustomed to new modes of teaching and learning technologies. It was also challenging to manage those practical courses related to surveying and GIS by using online platforms. Courses related to these thematic areas, land administration and surveying, need close facilitation by teachers and intensive field and lab works. Moreover, it was very challenging particularly for those students who came from far rural areas where internet access/connectivity is very poor and as a result educational inequality was one of the features of online teaching-learning practices in Ethiopia (Belay, 2020). Therefore, thinking about online learning for most students who came from rural areas with no electricity was a luxury and was not applicable.
- The UoJ opted for a plan B that request academia staff to prepare reading materials to be distributed to the students to read at home for three months. And then students will have intensive course be done at university by dividing students to small numbers.

3.9.Challenges faced when implementing online education: practical lessons

Offering practical/laboratory-oriented courses, like geospatial engineering session using online teaching was even more difficult than teaching theory as it required actual field practice. In the first two weeks of the university education closure, teachers in higher education institutions in Ethiopia have had the order to communicate with their students via email (send materials, assignments, and projects etc) to facilitate online learning. After university students left the campus, learning via the internet or electronic media becomes unthinkable because more than 80% of university students are rural-based without electricity, laptop, smart-phone, desktop, and the world's top expensive internet (Mengistie, 2020). Hence, the practice of online education in land administration in Bahir Dar University in particular and in Ethiopia in general was not an easy way for the students and teachers of higher education institutions to implement and produce skilful and competent graduates in this highly competitive world. There were no attempts to implement online teaching and learning for the practical part of the curriculum at AU.

The challenges shared by other universities (UEA, UoN, INES & NUST) were the similar with the ones faced when teaching the theory part and include:

- Poor and/or absence of internet connection, electricity mainly in rural area;
- Reduced engagement;
- Lower focus and motivation from the students leading to decreased learning outcomes;
- Competition for the use of electronic devices in some households as multiple family members may have needed these devices for work or education simultaneously;

On the side of the students, the main disadvantage was that the lack of face-to-face interactions with peers and lecturers as it used to be for classroom lectures, leading to:

- isolation in some cases,
- negatively impact students' emotional well-being and their ability to collaborate effectively;
- struggling to self-discipline themselves and effectively manage their leading to lag and minimal performance.

The UoN particularly arranged for in-person attendance of practical lessons for students in groups though it was challenging to schedule these student groups.

3.10. Innovations in teaching

There were diversities in the interventions implemented by the universities as summarised in the Table 4 below.

Table 4: Interventions implemented by the universities during the pandemic

Platform	UEA	UoN	INES	BDU	UoJ	AU	UB	NUST
Webinars	x							
Turnitin		x						
Mobile phone (calls & sms)				x				
Email				x				
Social media (Telegram & Facebook)				x				
Blended teaching and learning						x		x
Open exam					x			

As indicated in the Table 4 above, the universities tried to find solutions that would allow to continue teaching during the pandemic. Table 4 shows the tools used in the teaching while table 3 highlights innovation and tools for communication and education. BDU used many channels than other universities. At UEA, many students found the webinars to be most helpful for receiving immediate feedback from experienced educators. They also testified that access to virtual learning increased equitability and inclusion to education, and those who attended more webinar sessions were less likely to feel socially isolated (especially for those who had access to internet). The open exam given at the UoJ was taken home by the students and submitted the next day. AU initiated the development of curricula for blended learning for 13 MSc programs, offered training for staff on preparation of curricula for online-based courses;

the decision to designate 13 MSc programs for phase 1 transition to online teaching. Even there was no lockdown in Burundi, ICT and virtual classes were adopted at the UB as an alternative for PhD students that were in country for data collection or visiting professor. As sector lead for education, UNICEF (2020) worked with the Ministry of Education and other key partners to develop a sector contingency plan for the response; and to mobilize resources from the Global Partnership for Education (GPE), which allowed the Ministry to put in place different distance learning platforms. The design of blended teaching and learning proposals were made by students and lecturers to improve the IT infrastructure at NUST for better teaching and learning.

3.11. Innovations in learning as seen by students

Online teaching was appreciated by the students from the UoN. They stated that the introduction of online learning assured their continued learning. Hence no time was wasted as a result of the virus' effects; cut down costs on travels to the centres to attend to the lessons. Quite a number of materials were generated and freely available on the internet/ making it now possible for the learners to access material - making it possible for Personalized Learning also through Artificial Intelligence (AI). However, most students at UoJ did not like this kind of teaching method specifically undergraduate students as they prefer face-to-face methods. INES students realized the challenges faced with online education and suggested to postpone the practical sessions and be covered once physical classrooms resume. This was what happened because many students had challenges to follow online classes.

3.12. Future directions of online education beyond COVID

The experiences with online teaching during the covid period demonstrated the adaptability of both lecturers and students and opened up new possibilities for enhancing education in the future, even beyond the pandemic. Collectively, the universities foresee a future for online education that combines the best aspects of digital learning with the strengths of traditional education. Academic institutions should then consider a blended learning approach to enhance flexibility and access to education, regardless of the location, and time in some cases. The pandemic has opened up the realization that it is possible to have online credentials. For instance, in Kenya there is an open university, which is purely virtual. From the contemporary perspective on teaching and learning, building a digital teaching and learning environment for land administration education where knowledge and information can be explored and acquired anytime and anywhere is crucial (Kim, 2023). Creating and utilising integrated knowledge for real-world problem-solving are becoming a new normal (Ibid).
However, trainings in digital skills will be crucial, given the importance of digital literacy highlighted by the pandemic. Advanced online assessment tools will need to be invested in to ensure fairness and security in evaluations. Educators should explore innovative pedagogical methods that combine online and in-person experiences to improve learning outcomes. Land administration and surveying education should continue to incorporate GIS and other technology-driven tools to prepare students for the digital demands of the field in the future. The online teaching should ensure inclusivity; the adoption of digital technologies by both

students and lecturers; sustainability in terms of tuition fees as well as developing regulations and policies to guide the adoption of online education at the University level.

4. Conclusion and results implications

The purpose of this paper is to provide experiences from eight universities part of the Eastern Africa Land Administration Network (EALAN) or member of Network of Excellence on Land Governance in Africa (NELGA) by both educators and students as a response to the COVID-19 pandemic. Various lessons, benefits and challenges from the crise have been experienced from multiple angles, and in turn equipped both teachers and students with new insights and skills, which have the potential to shape the future of education at the universities. Benefits like virtual conference/class from anywhere at any time, introduction of online education resources, flexibility in learning process, reduced travel budget, etc. were shared by the participating institutions. Whereas limitations related with access to reliable internet, insufficient ICT infrastructures coupled with low literacy in their use, costs associated with the use of online teaching/learning, electricity challenges, lack of in-person interactions, etc hindered the education during the pandemic.
The outcomes of this study raise questions about the applicability of online teaching/learning as its access could be limited to those who can afford the associated cost. The Eastern Africa universities to go fully digital may require a lot of investments and lecturers' preparedness with online education. This would have implication on the SDG 4 on quality education. Higher education institutions that teach land administration have to provide necessary knowledge, skills, and expertise needed to effectively manage and administer land resources. Universities' role is to prepare competent professionals to work in government agencies, land management organizations, surveying and mapping firms, consulting firms, and other land administration related sectors. With the difficulties that some faced during the pandemic, their graduates will not be able to compete with other who had full access.

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