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DIGITALISATION OF EDUCATION IN THE UNDER-RESOURCED EDUCATIONAL SYSTEM OF THE GREAT LAKES REGION: WHICH DIGITAL PLATFORMS AND MEDIA FOR WHICH PURPOSES?

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Abstract:
The digitalisation of education has become a sine qua non condition for the success of education in an increasingly globalized world. Consequently, a multitude of educational institutions have adopted the use of digital platforms in the teaching and learning process, leading to the implementation of digital tools in education. Moreover, in the context of COVID-19 pandemic, educational institutions, including universities, have rapidly transitioned to distance and online learning. However, a variety of platforms are used and recommended for teaching and learning as well as other related educational purposes. The success of digitalisation of teaching and learning relies on the choice of an appropriate e-learning platform. Unfortunately, little is known about the criteria used by educational institutions in under-resourced contexts to select the appropriate learning platform. Therefore, this study intended to identify the educational platforms utilised in the African Great Lakes Region, along with their respective usage purposes, and to present a set of criteria to use for selecting an appropriate platform in an under-resourced context. To this end, the study employed both document analysis and semi-structured group interviews. In total, 72 teachers were interviewed. The results of this study reveal a synoptic overview of criteria and indicators to guide the process of digital platforms. Moreover, digital media relevant to the context of the African Great Lakes Region, i.e. radio, television and WhatsApp, are mainly used for teaching and communication purposes. The digital platform which is visibly used in higher education is Moodle, with the possibility to be combined with other platforms to facilitate interactive learning. The

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study ignites an outlook for further research as well as political and practical implications regarding digitalisation of education in an under-resourced context.

Keywords: digitalisation of education, under-resourced education system, Great Lakes Region, digital platforms

1. Introduction

In today's world, digitalisation has been adopted as one of the most powerful instruments of the globalised world, with the information and communication technology industry. It is a key to the ongoing industrial revolution, which is based on technology that is not reliant on steel and human physical power, but on bits and bytes (Dekker & Thakkar, 2018). Education, as a foundational element of development, cannot be isolated from the dynamic forces that shape the contemporary world. It is becoming increasingly digitalized and preparing the younger generation for a digitized life. In this perspective, the African Great Lakes Region, with its challenging characteristics of identity, has started the integration of digitalisation in different sectors of life, including education. However, little is still known about digitalisation of education in the African Great Lakes Region. The present paper is an exploration of existing studies on the criteria for adopting digital platforms and media, as well as those used in educational institutions as well as experiences of teachers, as far as their use in teaching and learning is concerned.

2. Digitalisation of education in the Great Lakes Region: Contextual overview

Since the last three decades, the African Great Lakes Region has been a theatre of wars, conflicts within and between countries, i.e. Rwanda, DRC and Burundi. The three countries which were united in the CEPGL (Communauté Economique des Pays des Grand Lacs/Great Lakes' Countries Economic Community) from 1976. However, after different wars in the region, the CEPGL was shaken, and cooperation became so weak. From 1994 with the crisis in Burundi and the genocide against Tutsi in Rwanda, as well as the war in former Zaïre (today DRC), which started in 1996, the region has fallen into precarious conditions in all areas of life, including education (Nibishaka 2025, Salmon 2004). As this paper focuses on two of the three CEPGL member countries, it provides an overview of the context of the digitalisation of education in Rwanda and the DRC.

Concerning education, there is an increased enrolments rate. For example, gross enrolment rates have increased in the DRC from 56 to 67 % and from 39 to 59 % in primary and secondary education (World Bank, 2015). However, internal efficiency (dropout, promotion, and transition rates) is still an issue that needs to be addressed. For instance, 10.9% and 10.3% of children drop out of primary and secondary education, respectively, and this is more significant in rural areas in Rwanda (MINEDUC, 2022, p. 97). Moreover, the inequality and quality of learning in terms of learning outcomes (competences) are issues to be reflected (World Bank, 2018; World Bank, 2015; World Bank, 2011). For

example, in both Rwanda and the DRC, children end primary school education without basic competences in literacy and numeracy (World Bank, 2018; UNESCO, 2014). Despite the increase in the number of graduates in both regions, employers report a lack of a competent workforce (HEC , 2015, p. 102; World Bank, 2015). This means that the quantitative increase in enrolments is not positively correlated with qualitative improvements.

Education has the potential to be a tool for social and economic transformation in the journey towards sustainable reconciliation and reconstruction in Rwanda and the DRC. In this journey, Information and Communication Technology (ICT) is seen as an engine for sustainable development in Rwanda and the DRC (MINEDUC, 2016; RDC, 2019). In this orientation, the necessity for equipping students with digital competences is a major concern in political debate in Rwanda and the DRC. In addition to the integration of ICT in curricula at all levels of education, the ICT in education policy was approved by the cabinet in 2016 (MINEDUC, 2016) in Rwanda and 2019 the policy was adopted in the DRC. In Rwanda, the policy indicates that ICT should be a tool for teaching, learning and assessment, for teacher training and for monitoring education. Several initiatives have been taken to strengthen this policy.

During COVID-19-related times, governments and other stakeholders initiated different programmes on radio and television as media for teaching and learning in nursery, primary and secondary schools. Moreover, universities organised themselves to start online teaching and learning. Unfortunately, the existing infrastructure, combined with the socio-economic situation of schools and students, especially in remote areas, has remained a challenge for equitable access to teaching and learning. The following table shows the general picture of educational institutions concerning digital facilities:

Table 1: Situation of digital infrastructure and facilities in Rwanda schools and universities

Aspects	**Nursery**	**Primary**	**Secondary**	**University**
% of schools with electricity	49.8	85.7	92.2	100
% of schools with internet connectivity	NAii	34.8	61.1	100
% of schools with computers	NA	83.4	85.4	100
Student: Computer ratio	NA	1:10	1:8	5:1
Teacher: Computer ratio	NA	1:14	1:4	3:1

Source: (MINEDUC, 2020).

In an attempt to cope with the critical situation of wars and conflicts, the Ministries of Primary, Secondary and Technical Education (EPST) and Higher Education have set up some distance learning programmes (e.g., courses on the radio, television, online exercises on social networks, etc.). However, very few pupils have been able to follow this programme, as most of them do not have the digital tools to access such distance learning.

The current state of digital infrastructure and facilities in DRC schools and universities indicates a significant shortage of electricity and internet connectivity (Melki,

[ii] NA: Not available

2025). The schools are facing a lack of and an insufficiency of digital materials, including computers. Furthermore, the detailed national-level statistics on this issue are still not available (Voufo, Carvalho, Kazumba, Malu, & Savchenko, 2024)

It should be noted that in the DRC, the government has already defined the policy for the use of digital technologies (RDC, 2019, pp. 45-49). Despite the seemingly political will, the limited digital pedagogical and didactic competences of teachers and the limited access and familiarity of students with digital learning need to be explored. Moreover, the nature of the digital media and platforms used, as well as teachers' experiences using them, have yet to be explored in the scientific discourse.

3. Digitalisation of education in global and great region perspectives

The utilisation of digital technologies has become a necessity in contemporary life, with the majority of services now being digitalised. The digitalisation of a range of services, including those related to education, finance, healthcare, administration and communication, is a global phenomenon. The limitations of physical proximity are no longer a significant obstacle to communication and collaboration. The production process is no longer contingent upon the number of hours personnel spend in the physical office. There is an increase in the number of home-based workplaces, which are becoming more accepted by employers. The society is becoming increasingly dependent on the computation of information through digital technologies (Dufva & Dufva, 2019, p. 18). Educational institutions are gradually integrating technology with the objective of equipping the younger generation with the adaptability required for future employability (AUC/OECD, 2021, p. 177). For the continuity of learning, the digitalisation of education was accelerated during the COVID-19 pandemic. Consequently, educational stakeholders invested in a variety of digital platforms and media. Unfortunately, the criteria for selecting them remain less explored in the scientific discourse. Due to the plethora of digital platforms and media currently available for use, the selection of appropriate ones represents a significant challenge for numerous educational institutions, particularly in the context of limited resources.

Despite political will and initiatives to digitalised education, challenges related to the limited digital skills of teachers and students, low connectivity, poor infrastructures and devices compatibilities are still alarming (Loglo & Zawacki-Richter, 2023). In the context of African Great Lakes Region, digital platforms have been put in place to support teaching and learning at different levels and forms of education (Niyibizi, et al., 2020).

The success of digital learning largely depends on digital platform (Al Handhali, Al Rasbi, & Sherimon, 2020). However, there is currently no established set of criteria that can assist under-resourced educational institutions in the Great Lakes Region in selecting optimal digital platforms for learning. This seems to become more complex in the context of limited access to digital infrastructure, internet connection and electricity. The field of research on this topic is still in its infancy, and the main criteria for selecting a digital platform have yet to be explored, particularly in the context of under-resourced context.

In addition, despite the quick decision of different stakeholders for continuity of learning during the pandemic of Covid-19, qualities of platforms, i.e. efficiency and effectiveness, remain empirically unexplored. The study at hand comes at a timely to fill this gap by exploring the digital platforms used in teaching and learning in the African Great Lakes Region. Moreover, the study delineates the specific purposes, usages and user perspectives of these digital platforms.

4. Material and Methods

Based on the paucity of research on the digitalisation of education in general and in the Global South in particular, the present study contributes to this research gap by answering the following research questions: What are the criteria of choosing digital platforms used in teaching and learning? What are the digital platforms and media used in teaching and learning in the African Great Lakes? What are teachers' perspectives on the use of digital educational platforms and media in teaching and learning in the African Great Lakes Region? Due to the dynamic development of technology, there is a plethora of digital platforms that are likely to be used in teaching and learning. The first question of this study is addressed by conducting a systematic review to explore the criteria and indicators that guide the choice of digital platforms. Digital platforms, educational digital platforms, and criteria for educational digital platforms were used as keywords. Data were gathered from ERIC and Google Scholar. There was no time limit for publications and all scientific publications were included. Qualitative research was adopted in relation to the existing platforms and media used in teaching and learning, as well as teachers' experiences about the use and usefulness of digital platforms and media (Savin-Baden & Major, 2013). Existing literature on the topic in the African Great Lakes Region was also consulted. Semi-structured group interviews were used to collect data from 24 group interviews purposively selected in 24 educational institutions, i.e., six at each level of formal education: nursery, primary, primary, secondary and higher learning institutions. It is worth noting that each group interview consisted of three interviewees. Accordingly, 72 teachers were reached during the data collection. As far as their qualification is concerned, 36 have secondary education, 18 have bachelors' degrees, 12 have master's and 6 have doctoral degrees. Concerning gender, 30 teachers were female and 42 were male. Concerning the language of group interviews, while half was done in French, the other half was done in English due to the diversity of the language policy in the two countries. After data collection, the interviews were transcribed and translated (from French to English). The transcripts were systematically coded using thematic content analysis (Savin-Baden & Major, 2013). Accordingly, the focus was on the content of the interview transcripts in relation to two research questions. In terms of research ethics, the purpose of the research was explained. It was made clear that participation was voluntary, and the possibility of withdrawal during and after data collection was explained. To ensure confidentiality, anonymisation of interviewees was guaranteed by using the names of vegetables.

5. Results

The findings of the present study are presented in three main sections in line with the research questions. Criteria and indicators for guiding the choice of digital platforms (5.1), perspectives of teachers about the types (5.2), as well as their use (5.3) are synoptically described.

5.1. Digital educational platforms in educational institutions

It is evident that a variety of digital learning platforms are used in educational institutions for learning purposes. The potential relevance of technology in education provides several opportunities for the teaching and learning process, including access to digital teaching and learning materials, social learning interaction, and the ability to bridge the distance between teachers and their students (Sangrà & González-Sanmamed, 2010, p. 209). The term "*school learning platform*" denotes the integrated development and utilisation of assorted digital instruments and applications, which allow teachers and students to engage in learning activities by creating and sharing online resources, communicating as individuals and in groups, as well as collaborating, and assessing students' works (Selwyn, Banaji, Hadjithoma, & Clark, 2011; García & Jorge, 2006).

In selecting an appropriate platform for promoting learning, it is necessary to consider a number of factors. As example, an online virtual simulation course platform that effectively promotes quality learning should include rich teaching cases with practical teaching guidance, interactive feedback as well as with simple methods for operation (Wu, et al., 2023, p. 1). The platform should facilitate innovative instructional methods that enable instructors and learners to learn, share and gain knowledge and skills (Edward, Asirvatham, & Johar, 2018, p. 2591). It should actively develop different interactive formats, such as those involving question-and-answer sessions, or/and recording of learning videos or real-time lectures, with the objective of enhancing the quality of learning. It is important to consider the technological limitations of the platform and provide different teaching methods to overcome these challenges. The design of an educational digital platform should be easier to operate and use for learning purposes (Chen, et al., 2020).

A synthesis of the literature reveals a diversity of criteria and corresponding indicators for determining the suitability of a digital platform for teaching and learning. These are presented in Table 1.

Table 1: Which indicators for a good educational digital platform?

Criteria	Indicators	Sources
Mode of use	Online or offline: Can the digital platform offer online and offline possibilities of learning?	(Chen, et al., 2020; García & Jorge, 2006)
Model of e-learning	Blended learning, social learning, Massive open online course (MOOC), adaptive learning	(Tsankov & Damyanov, 2017; Selwyn, Banaji, Hadjithoma-Garstka, & Clark, 2011).
Functionality	Synchronous and/ or asynchronous collaboration, integration of interactive plays, audio-visual conference integration, management of teaching and learning process.	(Tsankov & Damyanov, 2017; García & Jorge, 2006)
Standard e-learning	Integration of standard into platforms. E.g.: SCROM (Sharable Content Object Reference Model), TinCan (allowing variety experience including non-digital activities), xAPI (Experience API), …	(Lindert & Su, 2016; García & Jorge, 2006)
Portability and compatibility	Mobile phone, desktop or laptop computer, tablet, television screen, …	(Ouadoud, Chkouri, Nejjari, & El Kadiri, 2016).
Accommodation	On premises, SaaS	(Rao, Rao, & Babu, 2014)
Business model platform	Paid or open source	(Zancanaro, Nunes, & Domingues, 2017)
Maturity (Stabilisation)	Number of years of being used	(Kim, Lee, & Hwang, 2018)
Learning community	Number of communities used	(Wu, et al., 2023; Edward, Asirvatham, & Johar, 2018).
Personalization	Integration plugin, strong setting	(Tsankov & Damyanov, 2017)

Source: Literature according to the indicated sources.

In essence, the aforementioned table summarizes characteristics to reflect on the description of the criteria and indicators of the learning platform according to different needs.

5.2 Educational Platforms and Media in the African Great Lakes Region

This section presents a description of the existing digital platforms and media, as well as the status of their use in the African Great Lakes Region context at different levels of formal education.

5.2.1 Digital platforms used at nursery, primary and secondary education in DRC and Rwanda

A variety of educational programmes were put in place at nursery, primary and secondary education for the purpose of enhancing teaching and learning. For instance, in both countries, lessons were broadcast on national media i.e., radio and television. During the COVID-19-related lockdown, children used to follow them with the support of their parents or siblings (Kitengie, Lutula, & Mukembe, 2022). In the context of limited digital resources, i.e. particularly in remote areas with poor families, radio and television

were used as they have the potential to reach a vast audience. Children, with or without their parents, wherever they are, could have access to synchronous learning. It is imperative that students remain attentive and aware of the time of the broadcast of the lesson; unfortunately, there was no opportunity to replay it. In addition, it is worth noting that such media could be integrated into a variety of electronic devices adapted to the context of the region, i.e., mobile phones, radio and television screens, and, to a limited extent, computers. Unfortunately, they all require electricity and yet still access is still limited, especially in rural areas.

During school closure, a number of local telecommunication companies, government's education agencies distributed educational materials, i.e. books and exercises to students through phone messages and educational applications accessible by students via internet connection (Niyibizi, et al., 2020). Telephone messages, particularly via WhatsApp, were used by educators to communicate with parents in different ways. Communication to parents encompasses a variety of content, including notifications of urgent school information, instructions for students on the completion of assigned exercises or homework tasks, and sharing relevant educational resources, such as books. WhatsApp requires a connection to the internet to be operational. It allows some form of interaction between the teacher and students, operating through asynchronous interaction. An individual could send a message, which will be received by the intended recipients once they are connected to the platform. In the time that a response is necessary, the recipients could reply back. This means that in countries such as DRC and Rwanda, digital media: radio, television and social media of WhatsApp were used to help children have access to education during the time of lockdown. Mainly, two interconnected purposes can be identified: teaching and communication. Radio, television and WhatsApp social media were used by the government, in collaboration with other stakeholders, to provide remote teaching. Teaching was not only restricted to the school-related content, but also included teaching about global pandemic containment. Additionally, the indicated media were used to communicate between parents and teachers as well as school administrators about instructions concerning the continuity of learning during the pandemic. Moreover, the media were used to communicate content to be learnt as well as tasks to be done by students at their respective homes and sending completed tasks to schools. More than that, WhatsApp in particular was used for sharing information about the individual and family life of children. This shows that in both countries, the DRC and Rwanda, limited digital platforms were used at nursery, primary, and secondary education. Meanwhile, one platform was used by the school coordination of the Baptist church in North-Eastern DRC under the technical and financial support from the Canadian Baptist Mission.

Tusitawi is a Kiswahili term which means "*Let us flourish*". It is an initiative aimed at providing access to learning resources. In the DRC, it is used by secondary school children and teachers. Schools are equipped with computers and iPads for students. The latter are allowed to use them when they are at home. On this platform, resources, nationally approved textbooks, are made available digitally. Students can have access to

the resources with internet and can download them for further use without internet. In addition, along with textbooks, students are provided with exercises to do within the platform and have the possibility of direct feedback. Tusitawi has some advantages, including the possibility of offline access to digital learning resources by students from remote areas. However, some limitations are observed. First, the platform was designed and is controlled in Canada. Staff in the DRC do not have access to it. Even minor changes require technical intervention from Canada. This might limit the contextualisation of the content and the use of the learning resources. Second, the possibilities of pedagogical transposition are limited.

In nutshell, digital media namely radio, TVs and social media i.e., WhatsApp were used in basic education as teaching and communication strategies. Moreover, one case of digital platform "Tusitawi" is used in selected secondary schools of Protestant schools' coordination in the North Eastern DRC.

5.2.2 Existing platforms utilised in higher education

The universities employed a variety of strategies to reach students during the lockdown, i.e. distance learning. A variety of digital platforms and media, including Moodle, Google Classroom, and WhatsApp, were employed to facilitate remote learning (Kitengie, Lutula, & Mukembe, 2022; Niyibizi, et al., 2020). The open-source Moodle platform has been predominantly used by universities within the African Great Lakes Region. This platform is employed for blended, social and adapted learning, and is mostly used when connected to the internet. It is employed for both synchronous and asynchronous teaching and learning processes. It has the potential to integrate other platforms, particularly those with a specific focus, such as videoconferencing platforms, to facilitate the live interaction between teachers and students. Moodle has already been tested and used internationally as an educational platform, and has the possibility to facilitate both individual and community-based learning. Moodle is also used for pedagogical and administrative purposes, i.e., managing grades and providing feedback. As a free platform that offers possibilities for adaptation to the realities of the contextualities of the diversity of universities, it seems to be more conveniently used by universities in the African Great Lakes Region.

In addition to Moodle, other digital platforms and media have been and are being used in higher education in the African Great Lakes Region. These include, but are not limited to, Google Classroom, Zoom and WhatsApp. Respondents indicated that the first two platforms are used for interactive digital teaching and learning sessions. Unfortunately, they indicated that access to interactive sessions during the lockdown was very limited due to expensive internet costs. Concerning the use of social media of WhatsApp, it was used for teaching and learning, especially for sharing resources and tasks as well as for receiving feedback from students. It was also used for interactive sessions especially through texts and audio recordings. The advantage of this medium is that students who are absent due to internet difficulties have access to the materials from both teachers and students' discussions when get connected (Niyibizi, et al., 2020).

In general, the identified digital platforms and media identified are designed to facilitate teaching and learning. They are also portable with the devices available in the region. Among these, Moodle has been the most prevalent in the context of the Great Lakes Region. It is noteworthy that Moodle is accessible at no cost. It appears to be a more practical option in the context of the Great Lakes Region, as it is being experimented with the standards of digital platforms, resulting in minimal errors and problems in its use and adaptability to quality education. It is capable of being used by different communities simultaneously, with the data stored on the school server or in the cloud. Moodle is arguably the most suitable platform for the Great Lakes Region, a region characterised by precarious learning infrastructures. It is a versatile platform that can be used for both asynchronous and synchronous learning, with the ability to accommodate other learning platforms.

The existence of digital platforms and media is important. More importantly, however, is whether users, i.e. teachers, find them useful. Accordingly, the perspectives of teachers on the use of digital platforms and media are described hereunder.

5.3 The views of teachers on the use of educational platforms and media in the Great Lake Region

The following section presents the participants' views on the use of educational platforms and media in their respective educational institutions

5.3.1 Experiences of nursery teachers about the use of digital platforms and media for learning

In the context of nursery education, telephone communication between teachers and parents serves the purpose of conveying information regarding the activities and exercises to be done by children. This was testified by Mushroom in this statement: "*We gave children assignments to work on at home through communicating with the parents by telephone*" (Mushroom: 711-712). In this citation, the interviewee indicates the use of the telephone as an educational medium between parents and teachers. This is used for sharing assignments and feedback from both students and teachers.

Additionally, digital media and tools, like radios, televisions and computers are present in the schools. However, the pupils do not manipulate them. During the period of lockdown due to the COVID-19 pandemic, facilitated by their parents, pupils were able to follow some lessons broadcast on national radio and television. At school, teachers use a variety of technological tools, including telephones and computers, to access educational materials such as films and songs, which they then utilise in their classrooms to facilitate the learning of their students. One of the teachers testified in this way: "*I know to open a computer, typing with it, download some games and show them to learners*" (Pumpkin: 87-88). In this excerpt, the interviewee, Pumpkin, shows the perspectives in which digital facilities are used in his daily teaching profession. He indicates having basic technical skills of using a computer, i.e., opening and typing. Moreover, he shows the usability of digital facilities to enrich teaching and learning in nursery education. Though he did not

indicated criteria to guide the choice, he mentions that he uses digital facilities to download films and songs for his teaching practice.

Furthermore, the empirical material of this study suggests that educators' understanding of digitalisation in education is limited to the presence of digital tools in educational settings. Consequently, they assert that they lack the requisite materials, including computers and other electronic devices, as well as specialised digital teaching and learning platforms and media that could facilitate the learning of nursery children through the use of technological tools. One of the interviewees stated: "*We don't use technology anymore because we lack computers and connections that can enable us to continue with it. We are ready to continue, but we lack computers, electrical power, and internet connection, and therefore we lack the ability to continue using that technology"* (Mushroom: 719-722). The educator restricts digitalisation of teaching and learning to the hard aspect "*physical presence of digital tools*".

In summary, interviewees see the necessity and importance of digitalisation of teaching and learning at nursery education. Despite the limitedness of digitalisation to hard dimensions especially presence of computers, they understand and use digital facilities for teaching and learning likely to be adapted to the level of children i.e., searching and use of films and songs.

5.3.2 Primary teachers' experiences about the use of digital platforms and media for learning

Teachers testified to a range of initiatives by primary schools with the objective of integrating digitalisation into teaching and learning activities. These initiatives encompass the search for appropriate teaching content and materials to be used in the lessons, as well as the communication with pupils' parents.

The teachers reported that they use a range of digital tools and media, including computers, smartphones, tablets, radio, WhatsApp, and television, in the preparation of teaching activities as well as communication with parents about their children's learning. Furthermore, digital facilities are also utilised for sharing exercises by teachers to be done by their children at home. One of the interviewees stated that: "(*We search for data, we can search for lessons on any subject, and we give learners an opportunity of practice by using computer"* Tomato: 47-50). Another teacher also said: "*We have only Xo Laptops for learners. We use them while teaching lessons focusing on ICT, for example, when we are going to explore computer my friends*" (Onion: 37-39). And another participant added: "*In other lessons, for example in English, technology is employed as a pedagogical tool to facilitate learning. This is evident in the teaching of listening skills, which can be developed through the use of radio and television*" (Tomato: 115-117). In these three citations, computers are seen as important digital tools and they are used for different purposes, including searching for information, teaching technical computer skills, as well as a tool for learning, such as teaching language skills, i.e., listening skills. From the empirical materials of this study, it is evident that interviewees did not see any digital platform used for teaching and learning. However, they see the power of using WhatsApp. The latter is used, they

indicate, to explain lessons via recordings, provision of exercises to students via their parents and feedback from students to teachers.

5.3.3 What do secondary teachers experience in terms of the use of digital platforms and media?

In the context of secondary education, teachers expressed that they use a range of digital tools and media for various purposes, including the preparation of teaching, communication with parents and teaching of different courses. The interviewed teachers indicated that the integration of technology in secondary studies was found to have increased during the period of COVID-19 during lockdown in many parts of the world. In order to maintain student engagement with the learning process, schools and government bodies have introduced practices of promoting students' learning from their respective homes. Teachers reported that they communicated with their students through calls and messages on the parents' phones to provide them with exercises for continuity of learning (Broccoli: 450, Cabbage: 64-68). One of the teachers reported what they did for keeping their students learning: "*On my side, during the lockdown, we used those telephones to encourage parents to let their children follow broadcasted lessons on radio and Television, we helped parents to remember time at which their children may sit down and follow lessons on the radio, and be sure that they did the exercises we used to give them through WhatsApp*" (Cabbage: 64-68). This quotation illustrates the utilisation of radio and WhatsApp as the main learning media for maintaining academic pursuits of secondary school students, especially during the pandemic-related lockdown. After the lockdown, digital tools continue to be used. As one teacher mentioned, "*I do my personal own professional development through my telephone and cultivate myself*" (Broccoli: 453), teachers employ digital tools for searching information for self-learning and preparing the materials for their teaching. This shows the perspectives of interviewees about digitalisation as a tool for self-professionalisation and enhancing practical professionality, especially offering information important for teaching and learning.

In nutshell, the interviewees show that digital media that contextually relevant are combined used to facilitated teaching and learning. Moreover, they see digital facilities as tool for self-professionalisation likely to contribute to improvement of their teaching.

5.3.4 Experiences of university teaching staff about the use of digital platforms and media

In higher education, lecturers reported the use of digital facilities in diverse activities. The process of transforming educational practices through digitalisation started a little bit early, just before the arrival of the COVID-19 global pandemic. They reported using a variety of digital platforms and media either formally or informally. The digital platforms and media used by the sampled universities include Moodle, Google Classroom, WhatsApp, Zoom, Google meet, and MIS (Management Information System) (Carrot: 27; Ginger: 37; Chayote: 47). As attested by the teaching staff of those universities, these platforms and media are employed for a variety of purposes.

The Moodle platform is the most prevalent platform used by the sampled universities in the region. Teachers attest to its utilisation within the teaching and learning processes. One of them stated, "*We are using an e-learning system that started in 2016. It is now operational, facilitating the delivery of online sessions to our students, as well as the administration of quizzes, their assignment via the Moodle platform*" (Carrot: 27-30). Another teacher also strengthens this assertion by saying that: "*And this system of Moodle has so many options, so many skills to learn, for instance you can deliver a lecture online via videocall, you can upload learning materials, you can assess, you can mark, you can provide feedback and then you can also provide the revised document, they can it to submit internship reports*" (Chilli: 36-39). The platform is used for providing online teaching activities, including teacher and student interaction through online lectures. It also facilitates communication of the teaching and reading materials to the students and provides access to learning activities, assignments, and assessments. Additionally, Moodle is employed by students to submit their work, which is then marked and feedback provided by the teacher.

The teachers testify that the WhatsApp platform is also used in teaching and learning process especially for communicating with the students by providing instructional materials such as videos, soft documents, learning announcements and facilitating learning discussions (Chayote, 68: Carrot: 82). Other platforms like Zoom, Skype and Google Meet, are incorporated in the Moodle platform or as other alternative options when video-conferencing is required for face-to-face online teaching (Chilli: 178). Apart from the platforms used in teaching and learning, Management Information Systems (MIS) platforms are employed to oversee the management of the institutions and also to host various teaching platforms, including Moodle. Teachers testify that MIS is a more useful tool for student management, as evidenced by the following: "*So, it was very difficult to go back then find their statistics and their records but now since we are using that MIS, it is easy to keep their marks so that anytime they can access anywhere without coming to the university to look for their files and what*" (Chilli: 91-101). As stated in this quotation, the MIS is an effective tool for maintaining student file records, including identification, academic performance, and information regarding their progress. This shows that digital platforms and media are not only used for teaching and learning but also for administrative purposes.

Despite the recognition and experiences of using digital platforms and media, interviewees see some challenges. For instance, the utilisation of educational platforms is impeded by the inefficiency of electronic materials, inadequate infrastructure (such as internet connectivity) and the limited skills of teachers due to insufficient training in digitalisation of education (Tomato: 31-34; Chilli: 378-381). This is particularly relevant if the context is the under-resourced Great Lakes Region, where all educational institutions do not have either electricity or any digital tools and facilities.

In summary, the empirical material of this study shows that digital platforms are limitedly used at the nursery, primary and secondary levels. However, digital media, i.e., radio, television, as well as WhatsApp, are widely used for teaching and learning.

Moreover, they are used for communicative purposes between parents and teachers. In higher education, the use of different educational platforms was reported in the sampled universities, i.e. Moodle, Google Classroom, and MIS. These platforms are sometimes combined with other platforms such as Zoom and Google Meet to facilitate interactive online learning.

6. Discussion of results

The results of this study show that in the Great Lakes region, schools and education stakeholders have started to digitalise education through different digital platforms and media, especially radio, television, Moodle, WhatsApp and Google Classroom. Moreover, teachers express different perspectives which they use especially for the preparation of and teaching. The results of this study are discussed from three perspectives. They include contextualization and decolonisation of digitalisation, digitalisation for educational social justice and Digitalisation beyond the use of digital tools: Digital competences.

6.1 Contextualisation and decolonisation of digitalisation: Relevance of digital tools and media

The empirical results of this study show that media like radio and television, as well as social media, were mostly used in the pursuit of the continuity of learning during the lockdown due to the global pandemic of COVID-19. They were mainly for reaching out to students in rural and remote areas. In the context of Rwanda, for example, 86.2% of the population have mobile phones with possibilities to use them as a radio, in addition to 81.3% of the population that own a radio (NISR, 2022) and 34.4% have access to broadband internet. There is a high possibility that radio was mainly used during the lockdown. This was likely to increase access to learning as compared to television, though, as used too, whose only 12.6% own televisions in their homes (NISR, 2022). Moreover, with the increase of mobile phones with the possibility of connecting to the internet, WhatsApp seems to be more accessible and less expensive. On the one hand, this can illustrate an important dimension of contextualisation whereby media and social media relevant to the contextual realities of the Great Lake Region were used to ensure continuity of learning. Despite the global character of digitalisation, glocalization of digitalisation is an important dimension so as to meet the needs of users (Yang, 2021). Moreover, the dynamicity and flexibility of digital platforms are important in the process of contextualisation of digitalisation of and in education (Jeffery, Rogers, Jeffery, & Hobson, 2021). For instance, Moodle is widely used in higher learning institutions in the African Great Lakes Region for different possible reasons. They include open access as well as possibilities to integrate other functionalities which are likely to be relevant to the realities.

The results of the same study reveal the use of digital platforms and media mainly hosted and controlled by the institutions in the global North. On the one hand, it can be

a sign of solidarity, especially by sharing digital facilities by institutions and individuals beyond vicinities. However, on the other hand, this can be a form of epistemic coloniality if generated knowledge and experiences shared through digital platforms are solely controlled by the global North. For instance, Tusitawi constitutes a contribution to bringing digitalisation to vulnerable children especially poor children from remote areas. However, total reliance on the host in the North can limit contextualisation. The platforms with educational purpose to meet the challenges of the region with poor infrastructure and economic abilities, the platiformisation of education, is challenged by limited access to electronic materials to host the platforms, shortage and inadequate connectivity, as well as the inadequate training of users, especially teachers. Therefore, digitalisation of education in the Great Lakes region should be reflected, considering these specific challenges. A reflected platform suitable for the region with not enough digital skills may be mature enough to be used, stabilised and not still at the level of experimentation (Kim, Lee, & Hwang, 2018, p. 120). The decision for its use must also consider the competences of local teachers in digitalisation, the policy of their professional development, the needed educational resources for their use, the development of digital competences of the region, and the teaching and assessment activities through digitalisation (Babushko, Solovei, & Solovei, 2022, p. 463).

6.2 Digitalisation for educational social justice

As the digital educational platforms operate as channels that facilitate the exchange of educational activities and content (Decuypere, Grimaldi, & Landri, 2021, p. 8), they contribute to the education of learners with several learning opportunities, especially by linking them with their learning content, colleagues and teachers' interactions (Chen, 2016, p. 7). Education through platiformisation in the Great Lakes region is still not accessible to all the learners as beneficiaries. When schools adopt them, learners with low socio-economic status are still indirectly excluded from the quality of education provided through digital platforms, as they are not able to afford the digital equipment and related infrastructure, such as internet and electricity connection (Yun, 2023, p. 12). This may contribute to the persisting socio-economic inequality in the community, as one part of the community will develop the competences, helping to fight for solutions to the problems, while others will remain there without an ideal education to change their lives for the better. These barriers can be reflected in the use of educational platforms and media to provide access to quality education. Some authors define a good platform as one that can facilitate the interaction of different user groups in different aspects and can integrate other platforms at the same time (Chen, 2016, pp. 7-8). The platform may facilitate both pedagogical and social justice by being process-centred and learner-centred and by addressing the diverse needs in order to mitigate the economic, cultural and political injustice as well (Bali, Cronin, & Jhangiani, 2020, p. 10).

6.3 Digitalisation beyond the use of digital tools: Digital competences

The results of this study illustrate a range of perspectives in which digital platforms and media are used in the context of teaching, learning, assessment, and administration of education. The more focus is put on the use of digital tools, platforms and media. However, digitalisation in the globalising world goes beyond the sole technical dimensions of using tools. The complexity and dynamicity of technological development, as well as its holistic immersion in the lifeline of human beings (Dunn, Munoz, & Jarrahi, 2023), digital competences seem to be more important. For instance, competences like search information literacy, creativity, innovation, critical thinking, communication and collaboration are documented as important for successful life in the 21st century (Ferrari, Punie, & Redecker, 2012). As this is not explicitly reflected in the perspectives of interviewed teachers, there seems to be a monodirectional-technical- understanding of digitalisation and missing its broader perspective.

7. Conclusion

The present study intended to examine the status of using platforms in education and to explore criteria that can be used to select an appropriate platform in an under-resources context, through a qualitative approach which used documentary analysis, group discussion interviews and content analysis. The findings show that digitalisation of education in the Great Lakes region is still at the embryonic stage, with challenges related to the relevance of the platform used, connectivity and accommodation infrastructures, access and training of users. In choosing a relevant platform to use in promoting quality education in under-resourced area, criteria such as mode of use, functionality, accommodation, personalisation, portability and compatibility of the platform, maturity model and standard of e-learning, as well as the learning community to be promoted, can be considered. In addition, while putting in place an educational platform, equity should be reflected to provide equal opportunities to all learners, regardless of their socio-economic background.

8. Recommendations

This study raises further implications for research, policy, and practice.

8.1 Implications for Science

The results as well as their theoretical contextualisation provoke a number of further research in the perspective of digitalisation of education. First, the digitalisation seems to be at an embryonic stage, and sometimes, the transition from non-digital to digital forms might require accompaniment. However, little is known about the experiences and challenges of teachers transitioning from non-digital to digital teaching and learning. Consequently, research on the transition from non-digital to digital teaching and learning is a necessity. Second, the study at hand explored the criteria and indicators of

educational digital platforms. However, their contextualisation, especially the extent to which identified locally used platforms fit unfit the criteria and indicators, remains unclear. Accordingly, there is a need to carry out analysis of the existing platforms in light of the identified criteria and indicators of choice of digital platforms and media. Third, the research was done with teachers; empirical research on perspectives of other users, like students and other stakeholders, requires further investigation. Fourth, the study focused on digital platforms and media, and yet there exists a plethora of apps for teaching and learning. Therefore, exploring the possible apps to be used by students and teachers in the context of an under-resourced context would be a further continuation of this topic. Fifth, the digitalisation of education is still a new topic in the scientific discourse, especially on the pedagogical and didactical side. It would be interesting to do conceptual research about digital teaching and learning at different levels of education. How could digital teaching and learning look in nursery education? How could the digitalisation of teaching and learning in primary and secondary education be implemented in practice? What are conceptual ideas for the digitalisation of teaching, learning, and researching at higher education? Sixth, the study at hand showed that media like radio were used to reach a larger audience. However, the extent to which the use of media and social media contributes to social justice in education remains unexplored.

8.2 Implications for policy and practice

As further political and practical implications of this study, intensive teacher training of digitalisation of teaching and learning at different levels of education (nursery, primary, secondary and higher education) is a necessity. The training should go beyond the use of digital tools and also focus on the digital competences of learners (Marrero-Sánchez & Vergara-Romero, 2023) as well as the pedagogical digital competences of teachers (From, 2017) as well as Competences of using Artificial Intelligence in education (UNESCO, 2024). Moreover, sensitisation of different stakeholders, i.e., parents, church leaders, and local communities, is a necessity so as to widen horizons of supporting children as far as quality of digitalisation is concerned. The results show that due to the diversity of social and economic backgrounds, some children risk being left behind due to limited access to digital infrastructures and facilities. Consequently, capacity building and sensitisation should go hand in hand with equipping schools with possible digital tools. Moreover, supporting poor families in terms of having access to digital tools and facilities, i.e., radio, television, internet, computers, telephones, remains imperative for sustainable digitalisation.

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The authors declare no conflicts of interest.

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