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REHABILITATION FOR ALL THROUGH DIGITAL INNOVATION AND NEW COMPETENCIES

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CONTENTS

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1 Executive Summary

The introduction of digital technologies has caused a revolution in the healthcare industry in recent years, sparking a change in the way rehabilitation services are envisioned and provided. A landscape analysis aiming to provide an overview of existing research and practices concerning digital competencies for rehabilitation professionals and ePedagogy in East Africa was conducted. There were three specific objectives including; 1) review of literature on digital competencies of rehabilitation professionals, 2) review of literature on ePedagogy, and 3) conduct survey on digital competencies among rehabilitation professionals in East Africa. The literature review on digital competencies of rehabilitation professionals was performed referring to the European Digital Competence for Citizens (DigComp2.2) Framework while the one for ePedagogy was performed using the European Digital Competence Framework for Educators (DigCompEdu). Main concepts, appropriate medical subject headings (MeSH) terms and keywords related to rehabilitation professional competencies and ePedagogy competencies were used to search the Pubmed, EBSCOHost and Web of Science databases. The survey on digital competencies was conducted using mixed methods. The quantitative part consisted of collecting data using the online Google Forms developed based on the DigComp2.2 for the rehabilitation professionals in clinical and community settings and the DigCompEdu for rehabilitation professionals in academic institutions. The qualitative part involved separate focus group discussions with clinical and academic rehabilitation professionals. Overall, the level of digital competencies among East African rehabilitation professionals appeared to be low and there exist several obstacles concerning digital literacy and awareness that require attention. Combined efforts from policy makers, researchers, and rehabilitation professionals in East Africa to ensure a successful integration of technology into rehabilitation education and practice in the region are recommended.

2 Background and Objectives

The introduction of digital technologies has caused a revolution in the healthcare industry in recent years, sparking a change in the way rehabilitation services are envisioned and provided.(Bonnechère et al., 2023) East Africa is a region at the crossroads of tradition and modernity, distinguished by its rich cultural diversity and distinct healthcare challenges.(Teriö et al., 2019) The potential of digital rehabilitation shows promise as the region's healthcare systems work to overcome infrastructural limitations and meet the needs of diverse populations.(Kamwesiga et al., 2018). Virtual reality, wearable technology, telemedicine, mobile health apps, and wearables are just a few of the technologies that fall under the umbrella of digital rehabilitation and have the potential to completely change how rehabilitation services are provided.(Dendere et al., 2021). Within the East African context, where healthcare resources are often constrained, leveraging digital solutions becomes increasingly vital. A landscape analysis aiming to provide an overview of existing research and practices concerning digital competencies for rehabilitation professionals and ePedagogy in East Africa was conducted. The specific objectives of the landscape analysis consisted of:

i). A literature review on digital competencies of rehabilitation professionals
ii). A literature review on ePedagogy and the future of rehabilitation professionals
iii). A survey on digital competencies among rehabilitation professionals in East Africa.

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By synthesizing current literature, knowledge, identifying gaps, and exploring innovative approaches, this landscape analysis seeks to inform stakeholders, policymakers, and practitioners on the opportunities and challenges in harnessing digital technologies to improve rehabilitation services in the region.

3 Digital Competencies of Rehabilitation Professionals in East Africa: A Rapid Review of the Literature

The digital revolution in recent years has had a profound impact on the global healthcare landscape (Alt & Zimmermann, 2021). In addition to revolutionizing patient care, the use of digital technologies has had a big impact on the duties and responsibilities of healthcare professionals (Alimbaev et al., 2021). A vital role in enhancing the quality of life for people with physical and cognitive impairments is played by rehabilitation professionals including physiotherapists, occupational therapists, psychologists, prosthetists and orthotists, rehabilitation physicians, nurses, and speech therapists.

The area of rehabilitation professionals' digital competencies is becoming more and more crucial as the digital age progresses, as it is crucial for them to be prepared to utilize technology for the betterment of their patients. Healthcare in East Africa has opportunities and challenges. The region faces a variety of challenges related to healthcare, including limited resources, inconsistent access to technology, and a constantly changing range of patient needs. These can be found in both urban and rural healthcare settings. Because of this, it is crucial for rehabilitation specialists in East Africa to possess digital competencies in order to deliver efficient, easily accessible, and superior care (Kamwesiga et al., 2018).

It is important to assess digital competencies of rehabilitation professionals to take respective measures in order to address the gaps and provide the best digitally driven rehabilitation to their patients. The purpose of this quick literature review is to investigate the present level of digital competencies among East African rehabilitation specialists. By examining the existing body of research, this review aims to shed light on the strengths and weaknesses in the digital proficiency of these professionals and identify areas where further training and development may be necessary. As they collaborate to improve the caliber and availability of rehabilitation services in the area, policymakers, healthcare institutions, educators, and rehabilitation specialists themselves will find this information to be extremely helpful in improving the lives of people with cognitive and physical disabilities.

3.1 Methods

This review was performed referring to the European Digital Competence for Citizens (DigComp) Framework and using the following methods:

3.1.1 Search strategy

Main concepts, appropriate medical subject headings (MeSH) terms and keywords related to digital rehabilitation competencies were used to search the PubMed database, and reference lists of relevant articles were also screened. For further details of the search strategy, see the Appendix 3.1.

3.1.2 Inclusion criteria

i. Studies and reports published from 1st July 2013 to the 30thJune 2023.
ii. English or French publications

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iii. Studies and reports specific to East African countries (Burundi, Comoros, Djibouti, Ethiopia, Eritrea, Kenya, Rwanda, Seychelles, Somalia, South Sudan, Sudan, Tanzania, and Uganda).
iv. Study designs (no restriction).
V. Publications about rehabilitation professionals including physiotherapists, occupational therapists, speech and language therapists, prosthetists & orthotists, psychologists, as well as rehabilitation physicians, nurses, and social workers.
vi. Full text available

3.1.3 Exclusion criteria

Studies and reports that do not focus on digital rehabilitation competencies in East African Countries.

3.1.4 Study selection

The retrieved studies were organized with the software Covidence (version 2023; Veritas Health Innovation). Retrieved publications (n=970) were first screened for titles and abstracts. Secondary, full texts of the papers which went through the first selection stage (n=53) were reviewed. At each stage, the screening was performed by two independent team members. In case of disagreement, consensus was reached by discussion and a third member to resolve the conflicts. Following screening, only three publications were found eligible for the review.

3.1.5 Data extraction

After screening the articles identified, data from each study was systematically extracted. The extracted information included the authors, publication year, country, study design, specialties of the rehabilitation professionals, and the key results. The extraction was done independently by two team members. A third member cross-checked the data extraction form to ensure consistency and accuracy.

3.1.6 Data analysis

A narrative synthesis of the included studies was performed, summarizing the study characteristics and findings.

3.2 Results

The review profile is shown in Figure 2.1. The PubMed Search yielded 993 publications, and one more known paper was added to have 994 publications in total, but we remained with 970 papers after 24 duplicates were removed. From 970 references, 3 publications (Bonnechère et al., 2023; Teriö et al., 2019; Vaca et al., 2018) were eligible for our review following screening.

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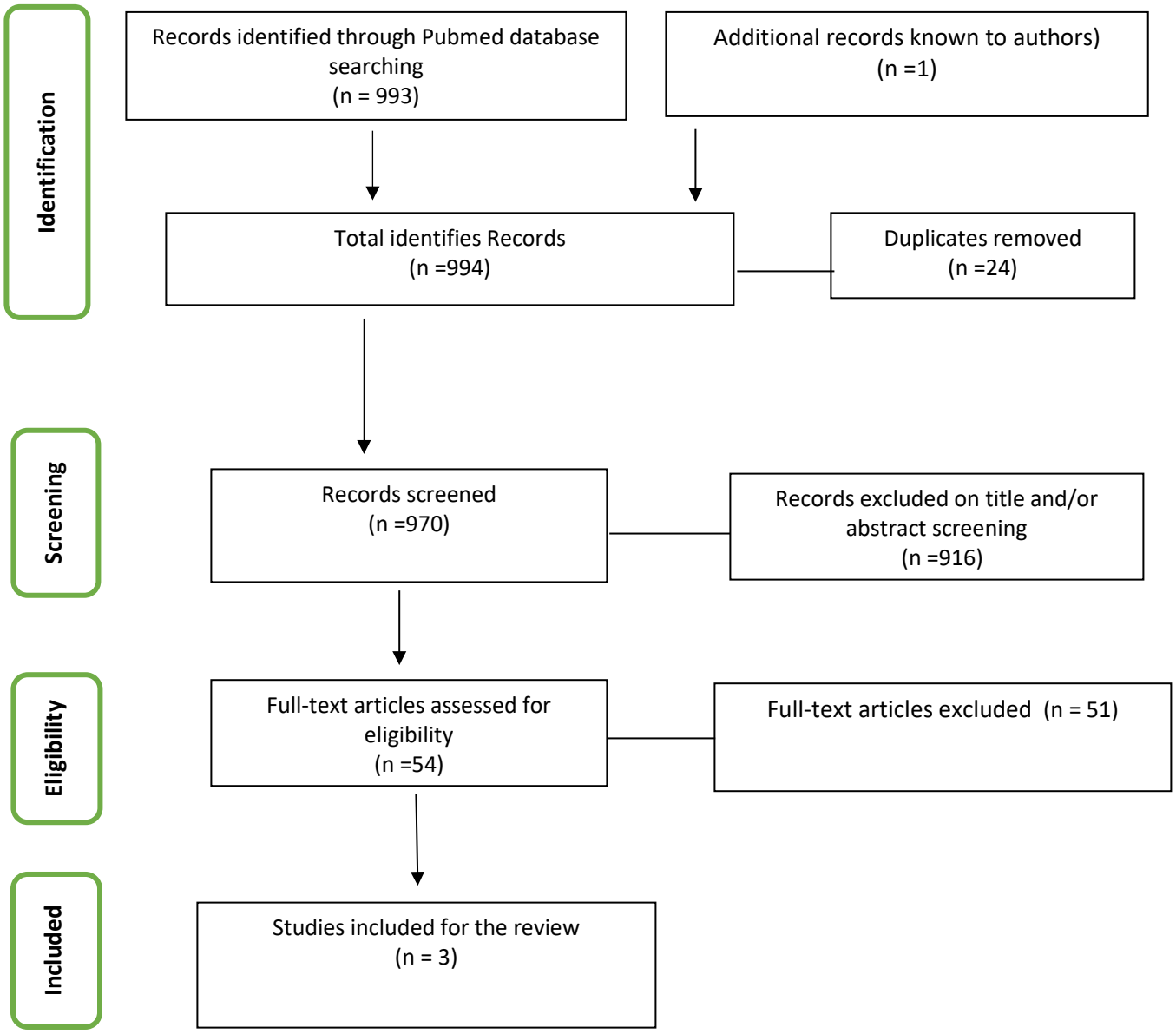

Figure 3.1: Review profile showing selection of studies.

3.2.1 Characteristics of included publications

The included publications represent 2/13 East African countries. Those two countries include Tanzania (1 publication) and Uganda (2 publications). One of the three publications involved on only Uganda as an East African Country, but also Ghana, South Africa, China, and India.

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The publications dates ranged from 2018 to 2023. One study consisted of a Single-case study design using mixed methods. Another study consisted of an online, modular Ponseti method training. The last one was a literature review on evidence supporting the use of mHealth in rehabilitation to identify the countries where studies have been carried out and the existing limitations of the implementation of such mHealth solutions and propose a 10-point action plan. Regarding the study participants, one included study involved only rehabilitation professionals including physiotherapists, occupational therapists, speech and language therapists and audiologists, orthotists and prosthetics, clinical psychologists, physical medicine, and rehabilitation nurses. For the remaining two studies, one involved physiotherapists, occupational therapists, orthopedic surgeons, general practitioner, nurses, and clinical officers. The rest included occupational therapists (OTs), physiotherapists, orthopedic surgeons, general practitioner, nurses, and clinical officers while the rest included OTs, researchers, information technology (IT) specialists and rehabilitation managers.

3.2.2 Reports on digital competencies among rehabilitation professionals

The participants across the included studies highlighted the importance of digital technologies due to shortage of consultation and treatment time. Lack of digital knowledge and skills are reported in both Uganda and Tanzania. It was recommended that the available digital tools and then should be perfectly aware of the possibilities offered by the technology, but also the limitations of these solutions. The importance to raise awareness among local clinicians about the availability and importance of the validations of digital tools in the context of LMICs were also highlighted. The reported study characteristics and digital competencies are summarized in Table 3.1.

Table 3.1: Study ccharacteristics and reports on digital competencies among rehabilitation professionals in East Africa

Authors	Publication Year	Country	Study Design	Participants	Relevant results
Terio et al	2019	Uganda	Single-case study design using mixed methods including semi-structured interviews and quantitative	12 participants: 4 OTs, 3 researchers, 3 information technology (IT) specialists and 2 rehabilitation managers	Participants mentioned lack of knowledge of the technical parts of the intervention, which made some tasks, such as handling the monitoring of SMS sending difficult to handle. Consequently, they expressed the need for more support and information from the IT technicians
Vaca et al	2018	Tanzania	An online, modular Ponseti method training (e-learning) course	30 clinicians: 4 orthopedic surgeons, 1 general practitioner, 17 physical therapists, 2 occupational therapists, 2	A total of 28 out of 30 participants reported no prior experience with online trainings. Some challenges were mentioned including internet connectivity and access as well as time. After this training, 100% of participants responded that

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				nurses, and 4 clinical officers	they “felt comfortable with online trainings” and stated that they would be willing to take an online training for a different clinical skill in the future.
Bonnechère et al	2023	**Uganda**, Ghana, South Africa, USA, Europe, Asia, Brazil, Russia, India, China,	Literature review	physiotherapists, occupational therapists, speech and language therapists and audiologists, orthotists and prosthetists, clinical psychologists, physical medicine and rehabilitation physicians, and rehabilitation nurses	Challenges for the clinicians: From the professional’s perspective, the most important point is probably education. First professionals need to be informed of available mHealth apps and then should be perfectly aware of the possibilities offered by the technology, but also the limitations of these solutions. Given the limited amount of time available to patients, mHealth must be as straightforward as possible to avoid wasting consultation time and jeopardizing treatment. It is also of the utmost importance to raise awareness among local clinicians about the availability and importance of the validations of mHealth in the context of LMICs

4 ePedagogy and the future of Rehabilitation Professionals in East Africa: A Rapid Review of the Literature

As digital rehabilitation technologies evolve, it becomes increasingly important to ensure that the individuals implementing these technologies are competent in the complexities of these technologies. These technologies include developments such as telemedicine and artificial intelligence and require users to understand the technologies as tools and their broader implications, such as their ability to make an impact. Considered in context, digital rehabilitation technologies are surrounded by a vast network of experts, consumers, service users, and policy makers. It is helpful to understand them in this broad context and ePedagogy related to Digital Rehabilitation should also explore this.

One approach that can help us understand how people view these tools and how they are implemented is to examine the pedagogies used to teach these tools in academic and training settings. Pedagogical approaches

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are important to address because they can have a powerful impact on the success or failure of technology implementation. The proactive use of pedagogical approaches has been shown to improve student engagement and motivation (De Grandi et al., 2019).

The use of ePedagogy has become more and more prevalent since the outbreak of coronavirus lead to changes in how schools teach their students. Learning management system and video conferencing both became ubiquitous components in academic and training circles. Pedagogy, and in this case ePedagogy, helps to bridge the gap between teaching and the use of these technologies to make sure they are being used properly in a teaching setting.

Within this interesting conflux of technologies, implementations and approaches there are many things to consider. At least one of these being the geographical location of countries where digital rehabilitation is being implemented and taught. This study specifically looked at ePedagogy in teaching of future rehabilitation professionals in East Africa using a rapid review of literature approach that used the Digital Competence Framework for Educators for Citizens

According to the Digital Competencies Framework created by the European Union, Digital Compentencies can be defined as confident, critical, and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It is defined as a combination of knowledge, skills, and attitudes (Vuorikari et al., 2022). The framework has been shown to be valid for assessing the digital competences of higher education students in the African context and thus helps to develop interventions to enhance digital literacy (Abubakari et al., 2023).

Assessing the digital competencies of educators and students pursuing careers in rehabilitation is crucial to implementing targeted measures during education. This ensures the mitigation of gaps when equipping new professionals to deliver optimal digitally driven rehabilitation to their clients. The aim of this rapid review is to examine the current extent of digital solution utilization among East African rehabilitation educators, identify the technologies already integrated into teaching practices, the main digital competencies and determine challenges associated with implementing ePedagogy in the field.

By examining the existing body of research, this review aims to summarize the strengths and weaknesses of ePedagogy solutions in EAC and identify areas where further support and development is needed. As Institutions of Higher Education are responsible for educating future rehabilitation professionals, it is important that digitalization is well utilized already during the studies. This review will provide useful information to the HEIs in East Africa, as it serves as a foundation to develop the rehabilitation curricula further. HEIs will find this information useful in improving the quality of their educational programs to support the needs of an ever-evolving society.

4.1 Methods

This review was performed using the European Digital Competence for Citizens (DigComp) and European Digital Competence Framework for Educators (DigCompEdu) as references. These are standards for implementing digital frameworks.
In addition, the following methods were used:

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4.1.1 Search strategy

Main concepts, appropriate medical subject headings (MeSH) terms and keywords related to ePedagogy competencies were used to search the EBSCOHost and Web of Science databases. For further details of the search strategy, see Appendix 4.1.

4.1.2 Inclusion criteria

i. Studies and reports published from 1st July 2013 to the 30thJune 2023.
ii. English or French publications
iii. Publications about any rehabilitation program in East Africa
iv. Publications about either rehabilitation lecturers or students or both
v. Reporting on at least one of the domains of the DigComp for educators.
vi. Reporting on at least one digital pedagogical solution
vii. Full text available

4.1.3 Exclusion criteria

i. Studies and reports that do not focus on digital pedagogy in East African Countries.
ii. Study designs: pilots, and systematic reviews were excluded.

4.1.4 Study selection

The retrieved studies were organized with the software Covidence (version 2023; Veritas Health Innovation). Retrieved publications (n=693) were first screened for titles and abstracts. Secondly, full texts of papers which went through the first selection stage (n=60) were reviewed. At this stage, the screening was performed by two independent team members. In case of disagreement, consensus was reached by a third member to resolve the conflicts. During the third phase, full text screening, the screening was done for four publications (refer) were eligible for our review by fourindependent screeners, after they extracted the required data based on the assessment questions each extract article went screened by two members. In case of disagreement, the consensus of a third member resolved conflicts. Following screening, four publications were found to be eligible for review.

4.1.5 Data extraction and analysis

After screening the articles identified, data from each study was systematically extracted. The extracted information included the authors, publication year, country, study design, purpose, research question, target population, data collection tools, main digital competence domains, digital pedagogy technologies used, reported challenges and conclusions. The extraction was done independently by two team members. A third member cross-checked the data extraction form to ensure consistency and accuracy. A narrative synthesis of the included studies was performed, summarizing the study characteristics and findings.

4.2 Results

The review profile is shown in Figure 4.1. The EBSCOHost search yielded 530 publications, and Web of Science search 171 publications (total of 701 publications), but we remained with 693 papers after 8 duplicates were removed. From 693 references, 4 publications were eligible for our review following screening.

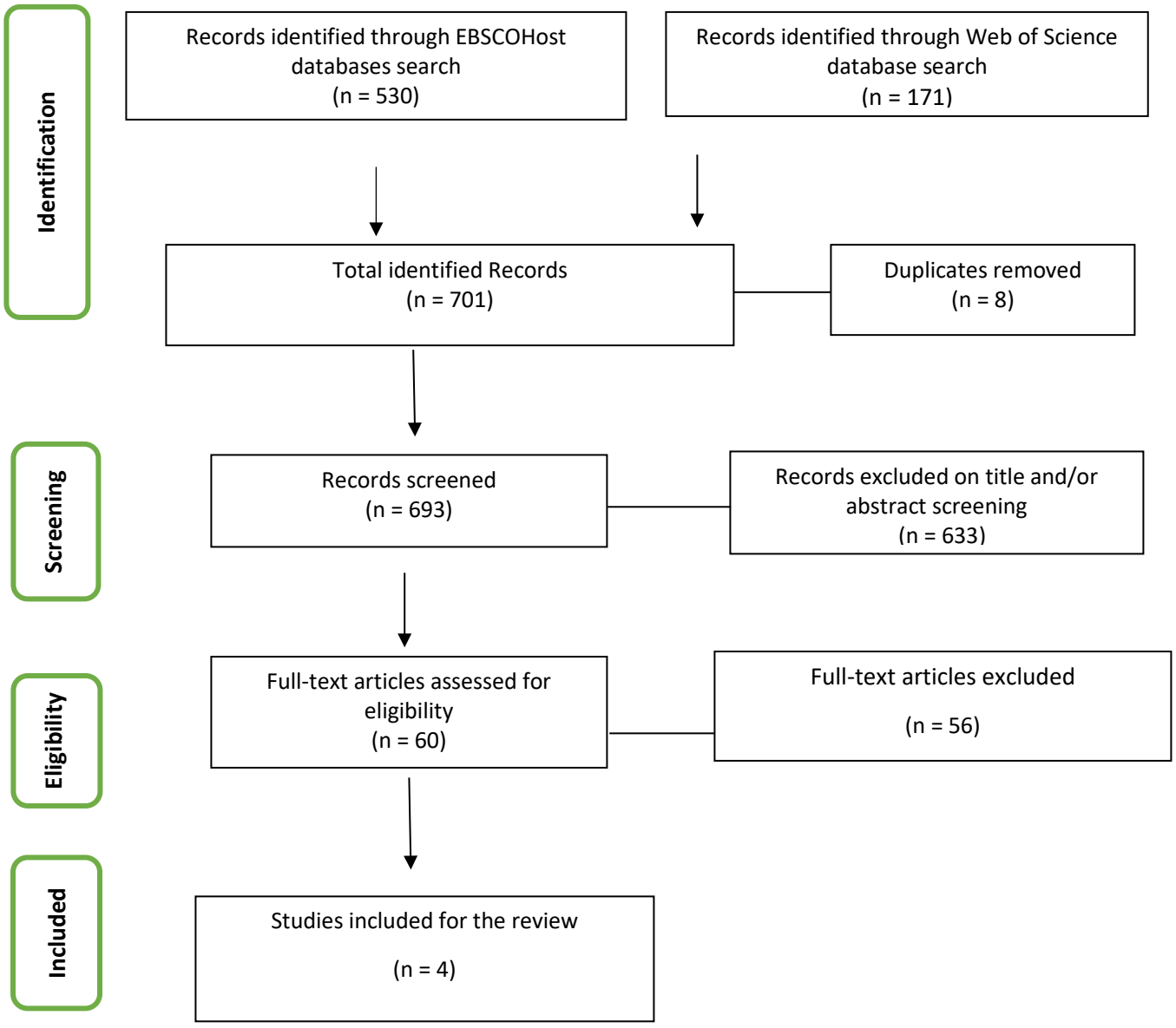

Figure 4.1: Review profile showing selection of studies

4.2.1 Characteristics of the included publications

The included publications represent four East African countries. Three of the articles included only Rwanda, Ethiopia, and Kenya, while the fourth article included Kenya, Uganda, and Rwanda.

The publications dates ranged from 2018 to 2022 (table 4.1). Two of the studies were cross-sectional, one qualitative and one case study. Byungura et al. (2018) studied with survey the level of familiarity with technology by first-year students in higher education, considering the case of the University of Rwanda. The cross-sectional study by Gachanja et al. (2021) was conducted using a multi-method design and explored the experiences of students and lecturers in an e-learning research course at the Kenya Medical Training College during the COVID-19 pandemic. Ferede et al. (2022) used focus group interviews to investigate, how different

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contexts can lead to differences in the teaching use of ICT among university teachers in Ethiopia. A case study by Niyigena et al. (2018) investigated the use of and attitudes towards technology among undergraduate students in Kenya, Uganda, and Rwanda.

Table 4.1: Study characteristics and reports on ePedagogy in teaching of future rehabilitation professionals in East Africa

Authors	Publication Year	Country	Study Design	Participants	Relevant results
Byungura, J.C., Hansson, H., Muparasu, M. & Ruhinda, B.	2018	Rwanda	Cross-sectional study	First-year students, 12,3 % from the College of Medical and Health Sciences	Strategies for improving experience and confidence with technology, for first-year students, are recommended. This will prepare new students for early technology uptake and readiness while empowering them to develop appropriate competencies and skills for the digital age.
Ferede, B., Eklen, J., van Petegem, W., Hunde, A. B. & Goeman, K.	2022	Ethiopia	Qualitative study	HE instructors from 3 different Ethiopian universities	Instructors use ICT for course facilitation, preparation of course materials, professional development, assessment, and exchange of information and resources. The transformative use of ICT in education needs to be increased and tailored and effective models need to be developed to put knowledge into practice.
Gachanja, F., Mwangi, N. & Gicheru, W.	2021	Kenya	Cross-sectional study	Higher diploma students and lecturers	Portrayed the potential of technologies for online classes, content delivery, assessment quizzes, peer-graded assignments, and communication between faculty and students.
Niyigena, J.P., Jiang, Q.S., Hasan, A.S.M.T., Ziou, D.,	2018	Kenya, Uganda, and Rwanda	A case study	Undergraduate university students	Students' attitudes towards computers are positive, but they often do not use ICT to support their learning and are not required to use computers. ICT facilities at

Chen, H. & Wang, P.G.					universities are often inadequate. ICT should be integrated into university curricula. The use of smartphones and the provision of learning materials in students' native language are recommended to facilitate the effective use of ICT for learning

4.2.2 Digital pedagogy technologies in East Africa

This section explores the landscape of digital technologies utilized in educational settings across the region. It examines various tools and platforms employed in teaching and learning processes.

From the first article reviewed, a range of digital devices and technologies are highlighted, including desktops, laptops, tablets, smartphones, digital cameras, and PDAs. Additionally, it mentions applications such as e-learning systems, e-libraries, file downloading, web conferences, emails, and office software like Word processing, Excel spreadsheets, and PowerPoint (Byungura et al., 2018) .

The second article underscores the significance of ICT tools like the Internet, presentation software, educational software (e.g., AUTO-CAD, GIS, SPSS), and storage solutions in education. It emphasizes the use of ICT for accessing educational resources, creating presentations, conducting practical lessons, and assessment purposes (Gachanja et al., 2021).

Further, the report discusses the transition to online learning facilitated by the Moodle e-learning platform. It highlights the use of communication tools like WhatsApp for real-time discussions between faculty members and the importance of institutional support in terms of ICT infrastructure, faculty training, and access to computers (Ferede et al., 2022).

Finally, the report mentions the prevalence of mobile phone devices as the primary technology among undergraduate students in the East African Community. While students from urban areas engage with computers for various tasks, including word processing and graphic Design, those from rural areas predominantly rely on mobile applications for social networking, news, and learning resources. However, despite the availability of digital tools, the study reveals a limited integration of ICT into students' learning practices (Niyigena et al., 2018).

Overall, the report provides insights into the diverse digital pedagogy technologies utilized in East Africa and underscores the need for enhanced integration and support to leverage the full potential of these tools in education.

4.2.3 The main digital competence domains

The landscape of digital competence domains, as outlined by the DigComp and DigCompEdu frameworks, is critical for understanding the proficiency levels and needs of learners in the digital age. Through an exploration of four articles, we delve into various components of digital competence and their implications for education.

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The University of Rwanda faces a challenge where incoming students exhibit limited digital competence, particularly in information retrieval, data evaluation, collaboration, and digital safety. Factors contributing to this include low accessibility, ownership, usage, and prior experience with technology. Course designs must accommodate this heterogeneity effectively (Byungura et al., 2018).

DigCompEdu components emphasize facilitating learners' digital competence, assessing digital resources, professional engagement, communication content creation, guidance on self-regulated learning, and continuous professional development. It underscores the importance of integrating ICT into teaching to connect learning content with real-world applications, promote active learning, and provide access to abundant resources (Gachanja et al., 2021).

While competencies of digital pedagogy are not clearly defined, themes like source management in e-learning courses, technology access, and skills for students and teachers are addressed. The effectiveness of pedagogical solutions in e-learning courses is also evaluated, reflecting the evolving landscape of digital education (Ferede et al., 2022).

Competencies under the DigComp framework include information and data literacy, communication and collaboration, and citizenship through digital technologies. This study examines factors influencing computer attitudes, technology adoption patterns, usage behaviors, and the impact of location on technology utilization (Niyigena et al., 2018).

Literature underscores the multidimensional nature of digital competence, encompassing information literacy, communication skills, digital content creation, safety, problem-solving, and more. It emphasizes the need for tailored interventions to bridge the digital divide among learners and educators. Integrating ICT into teaching and learning processes is pivotal for promoting active engagement, access to resources, and the development of critical thinking and problem-solving skills.

Understanding digital competence domains is pivotal for designing effective educational strategies that harness the potential of technology while addressing the diverse needs and challenges of learners in the digital era. Further research and collaborative efforts are essential to advance digital literacy and competency across educational settings.

4.2.4 Reported challenges in digital pedagogy

In all four studies, limited access to ICT infrastructure was identified as a challenge. Barriers to access to ICT infrastructure were related to university policies or rules, due to which students did not have access to digital tools and the internet (Byungura et al., 2018; Niyigena et al., 2018). In addition, technical challenges, such as problems in downloading learning resources or the limited availability of computers, Internet connections, and other necessary technical resources were the reason for the limited access (Gachanja et al., 2021; Ferede et al., 2022). Both some students and universities face the challenge of possessing inadequate technological tools, which impedes their ability to effectively engage in learning and teaching processes. (Byungura et al., 2018: Niyigena et al., 2018). Furthermore, the absence of technical support for a variety of devices and software poses significant challenges for both students and teachers in utilizing them effectively. (Gachanja et al., 2021). Instructors and teachers may need help and guidance in using ICT tools and troubleshooting technical problems but also incorporating digital pedagogy into their teaching practices (Ferede et al., 2022).

Challenges arising from university practices were also highlighted in the research. One of the challenges is the lack of a clear institutional policy for integrating information and communication technology into teaching and

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learning (Ferede et al., 2022). University rules may limit students' use of technology or may not require their use (Niyigena et al., 2018). The introduction of new digital pedagogy and technology can be made difficult by a lack of time and incentives, but also by instructors' and teachers' resistance to change (Ferede et al., 2022). If the university's higher education curriculum does not include digital literacy and technology training, the students' readiness for the digital learning environment may remain incomplete (Byungura et al., 2018).

5 Survey on Digital Competencies among Rehabilitation Professionals in East Africa

In the rapidly evolving landscape of healthcare, the integration of digital technologies has become instrumental in shaping the way rehabilitation professionals deliver services and enhance patient outcomes. As we navigate the digital age, it is crucial to assess and understand the digital competencies of rehabilitation professionals in East Africa, as their proficiency in leveraging technology can significantly impact the quality and efficiency of rehabilitation services. This survey aimed to delve into the digital competencies of rehabilitation professionals across East Africa, examining their familiarity with and utilization of digital tools, software, and platforms in their daily practices. From physiotherapists and occupational therapists to speech-language pathologists and other allied health professionals, this research seeks to uncover the current state of digital readiness within the rehabilitation sector.

By conducting this survey, we hoped to identify areas where rehabilitation professionals excel in digital competence and pinpoint potential areas for improvement. The insights gained will not only contribute to understanding the existing digital landscape but will also inform strategies for developing tailored training programs and support systems that can empower rehabilitation professionals to harness the full potential of digital technologies. Ultimately, this exploration of digital competencies is a crucial step towards fostering a digitally adept rehabilitation workforce in East Africa. The findings will not only benefit individual professionals but also contribute to the overall enhancement of rehabilitation services, promoting innovation and ensuring the delivery of high-quality care in the region.

5.1 Methods

5.1.1 Study design

A mixed method approach for triangulation purposes was used. The quantitative component consisted of data collection using a structured questionnaire (European Digital Competency Framework) and subsequent data analysis using the Microsoft Excel Package 2010 and the SPSS software (27 version). The qualitative component consisted of data collection using Focus Group Discussions (FGDs) and thematic data analysis.

5.1.2 Study sites

This survey was conducted in Rwanda, Kenya and Tanzania.

5.1.3 Study Population

The study population consisted of rehabilitation professionals including physiotherapists, occupational therapists, speech therapists, psychologists, and prosthetists & orthotists working in clinical or academic institutions. In Tanzania and Kenya, also some optometrists and physiotherapy students were respectively involved in the FGDs.

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5.1.4 Sample size

For the quantitative data collection, all rehabilitation professionals who were reachable during the data collection period which was from 18th January to 19th February 2024, and fulfilling the inclusion criteria were recruited.

For the qualitative part, FGDs involved between 8 and 12 participants, clinicians and academicians separately, in Rwanda and Tanzania-Mainland. In Kenya, there was only 1 FGD including 4 clinicians and 12 academicians. In Zanzibar, there were three focus group discussions (FGDs) conducted, with one via WhatsApp (4 participants [clinicians]) and two face-to-face (3 participants [academicians]; 4 participants [clinicians]).

5.1.5 Inclusion criteria

Rehabilitation professionals including physiotherapists, occupational therapists, speech therapists, psychologists, and prosthetists & orthotists and clients for physiotherapy, occupational therapy, speech therapy, psychology, and prosthetics & orthotics services, fluent in English.

5.1.6 Exclusion criteria

Rehabilitation professionals who do not provide rehabilitation services like those in administrative positions.

5.1.7 Sampling strategy

a) For the quantitative data collection, a stratified convenience sampling was used. In fact, different rehabilitation professions such as physiotherapy, occupational therapy, speech therapy, psychology, and prosthetics & orthotics were approached and all those who were available and willing to participate in the study were recruited. Participants were recruited by the project team by disseminating the survey through their national associations WhatsApp links.

b) For the qualitative data collection, participants were recruited purposively, and the diversity in terms of sex, profession, education level and working area (rural vs urban) was considered.

5.1.8 Data collection procedures

Quantitative data were collected using Google forms and the survey links were sent to potential participants via the WhatsApp groups of respective national professional associations). To ensure a high response rate, the links were resent weekly twice as a reminder.
Qualitative data were collected using Focus Group Discussions (FGDs) on Zoom.

5.1.9 Tools and their validation

Two self-reflection questionnaires, one for rehabilitation professionals in clinical settings and one for those in academic settings were designed to be distributed using Google Forms as a web-based survey tool.
5.1.9.1 Questionnaire for rehabilitation professionals in clinical settings (Appendix 5.1): The questionnaire rehabilitation professionals in clinical settings consisted of two parts:

Part 1: Demographic profile including sex, age, education level, working experience and the setting type (rural or urban).

Part 2: Digital competency questions adopted from the European Digital Competence Framework for Citizens (DigComp2.2) which has twenty-one items divided into five major components including information and data literacy, content creating, communication, safety, problem solving. The first component is Information and data literacy which is an important element in understanding the competency level of participants focused majorly on individual's ability to search, find, appraise, sort, store and retrieve information using digital devices. The

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second component is Content creation. Content creation describes an individual's ability to create/delete /manipulate contents such as text and images in different application software such as Microsoft Word and Excel in digital devices. It also includes adjusting settings based on one's interest of use. On the other hand, communication focuses on an individual's capability to communicate, share, and interact with others using digital devices and network. It includes internet or local area connections. Safety assesses what people do to protect their devices from cyber/physical attack and the precautions they take on their own health. The last component is problem solving which focuses on assessing the skill of individual's potential in solving routine hardware and software problems encountered while using digital devices. Problem solving also evaluates where a person stops working when difficulties appear, or they look for digital solutions.

All items were measured in 5-point Likert scale ranging from strongly disagree (score 0) to strongly agree (score 4) (European Union, 2018).

5.1.9.2 Questionnaire for rehabilitation professionals in academic settings (Appendix 5.2): The questionnaire for the rehabilitation professionals in academic settings also consisted of two parts:

Part 1: Demographic profile including sex, age, education level, and working experience.

Part 2: Digital competency questions adopted from the European Digital Competence for Educators (DigCompEdu) Framework which has twenty-two items divided into six areas that focus on different aspects of educators' professional activities (Inamorato et al., 2023):
Area 1: Professional Engagement,
Area 2: Digital Resources,
Area 3: Teaching and Learning,
Area 4: Assessment,
Area 5: Empowering Learners,
Area 6: Facilitating Learners' Digital Competence.
The DigCompEdu) Framework tool was designed to work on a points system, with the total possible number of points scored ranging from 0 to 88. Each question is multiple choice, with five answer to choose from. Those five answers are given on a Likert scale, in which the participant should select one of the five options that best expresses their opinion in response to the question. The options are 'strongly disagree (score 0)', 'disagree (score 1)', 'neither agree nor disagree Score 2)', 'agree (score 3' and 'strongly agree (score 4)'.

Depending on the answer selected, between zero and four points can be scored on each question. Here is the relationship between the number of points and the level of competence (Inamorato et al., 2023):
Less than 20 points: Newcomer (A1)
Between 20 and 33 points: Explorer (A2)
Between 34 and 49 points: Integrator (B1)
Between 50 and 65 points: Expert (B2)
Between 66 and 80 points: Leader (C1)
More than 80 points: Pioneer (C2)

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5.1.9.3 FGD Guides

Qualitative data collection on digital competencies using Focus Group Discussions (FGDs): FGD guides for rehabilitation professionals in clinical settings (Appendix 5.3) and those in academic settings (Appendix 5.4) comprised probing questions related to digital competencies.

5.1.10 Data management

5.1.10.1 Data acquisition quality

The investigators used psychometrically sound instruments and measurement procedures. To comply with personal information regulation, researchers ensured that only essential personal information is collected and processed in alignment with the original research objectives and specified in consent procedures.

5.1.10.2 Data capture, storage, ethics, and legal issues

Custom-designed MS Excel data entry templates were used to capture quantitative data which are similar studies across participating countries. This ensured consistency in standards, terminology, etc.) allow for data sharing and meta-synthesis. Qualitative transcripts were analysed and stored by each research sub-teams. Data will be stored on a dedicated computer (and backed-up on the institutional server), password protected and accessible to the investigators only.

Anonymised data collected at all participating institutions will be transferred electronically to be centrally backed-up, updated, validated, monitored, and reviewed for potential meta-syntheses at the lead institution (University of Rwanda). The data at the lead institution will comply with institutional and country's data privacy regulations and laws. The data are password protected.

5.1.10.3 Data sharing

The raw data were shared electronically within the research group as described and for the purposes as outlined above. De-identified data may also be shared if required by selected journals for publications, provided that the journal meets international standards for data protection and sharing. Study findings will be shared at conferences, research publications, newsletters and personal communication with stakeholders including research participants.

5.1.11 Data analysis

5.1.11.1 Quantitative data analysis: all items were measured in 5-point Likert scale ranging from strongly disagree (score 0) to strongly agree (score 4). The Microsoft Excel Package 2010 and the SPSS (27 version) were used to analyse the data. Based on the descriptive nature of the study, the data analysis included descriptive statistics. For the digital competencies, the mean and standard deviations for each component, domain and overall scores were calculated. Finally, the participants were classified into different categories based on their overall scores (European Union, 2018). For the DigCompEdu, the Newcomer (A1) category is attributed to scores below 20, the Explorer category (A1) to scores between 20 and 33 (this upper limit corresponding to half of the items selected being "partial appropriation" and the other half "occasional use"); scores between 34 and 49 are mapped on the Integrator category; scores between 50 and 65 on the Expert (B2) category, thus splitting in equal halves the distance between the upper limit of the Explorer (A2) category

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and the lower limit of the Leader (C1) category. Scores between 66 and 80 are attributed to the Leader (C1) level and only those selecting the highest option for at least two thirds of the 22 competences would be qualified Pioneers (C2).

For the DigComp for Citizens (DigComp2.2) which has only 21 items (maximum score is 84), the Newcomer (A1) category is attributed to scores below 19, the Explorer category (A1) to scores between 19 and 32 (this upper limit corresponding to half of the items selected being "partial appropriation" and the other half "occasional use"); scores between 33 and 47 are mapped on the Integrator category; scores between 48 and 62 on the Expert (B2) category, thus splitting in equal halves the distance between the upper limit of the Explorer (A2) category and the lower limit of the Leader (C1) category. Scores between 63 and 76 are attributed to the Leader (C1) level. Scores between 77 and 84 are attributed to the Pioneers (C2).

5.1.11.2 Qualitative data analysis: qualitative data were analysed by data driven content analysis. The Zoom-recorded FGDs were transcribed and analyzed to identify the main patterns of responses and consistencies and divergences across participants. This process involved familiarization with the material on several readings. Common concepts were coded producing themes that were then classified into pre-determined broader categories.

5.1.12 Trustworthiness of the qualitative data

To establish the trustworthiness of the qualitative data, different strategies were used in order to truly capture the rich insights from the participants. To enhance credibility of the qualitative data, the themes presented were illustrated with representative quotations from the transcribed texts. To ensure confirmability of the qualitative data, a peer examination was used by the researchers discussing the research process and findings.

To enhance transferability of the qualitative data, a clear and distinct description of the selection and characteristics of participants, data collection and process of analysis was used. To address the dependability of the qualitative data, the researchers used a code-recode procedure during data analysis.

5.1.13 Ethical Considerations

Ethical clearance to conduct the study was obtained from the UR-College of Medicine and Health Sciences Institutional Review Board (IRB)(Approval Notice: 543/CMHS IRB/2023), JKUAT IRB (Approval No. JKU/ISERC/02317/1291) and KCMU College IRB (Ethical Clearance Certificate No.2671). At the first page of the online questionnaire, the participants were informed about the study objectives and that participation was voluntary and that they had the right to withdraw from the study at any time. Those who agreed to participate in the study provided the consent and continued answering the survey questions. For the qualitative data collection, the participants were required to provide consent for the online FGDs that were recorded. The survey was anonymous, only general socio-demographic information (such as country of residence, occupation, and years of working experience) was requested.

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5.2 Results

5.2.1 Quantitative results

5.2.1.1 Socio-demographic characteristics of the participants

A total of 220 rehabilitations professionals including 174 clinicians and 46 academicians responded to the survey. As illustrated in Table 5.1, the majority of the participants were physiotherapists for both clinicians (62.1%) and academicians (54.3%). Additionally, 73.5% of the clinicians versus 60.9% of the academicians were aged below 40 years. Only 20.1% of the clinicians and 52.1% of the academicians had a postgraduate level of education. About 60% of the clinical rehabilitation professionals were working in urban settings.

Table 5.1: The socio-demographic characteristics of the participants

Variable	Clinical rehabilitation professionals (n=174)		Academic rehabilitation professionals (n=46)	
Country	N	%	n	%
Rwanda	118	67.8	25	54.3
Kenya	25	14.4	10	21.7
Tanzania	31	17.8	11	23.9
Profession				
Physiotherapist	108	62.1	25	54.3
Occupational Therapist	26	14.9	10	21.7
Prosthetics & Orthotics	24	13.8	8	17.4
Psychologist	11	6.3	3	6.5
Speech and Language Therapist	3	1.7	0	0
Other	2	1.1	0	0
Age category				
Under 30 years	40	22.9	9	19.6
30-39 Years	88	50.6	19	41.3
40-49 Years	26	14.9	11	23.9
50-59 Years	11	6.3	7	15.2
60 or more	8	4.6	0	0
I prefer not to answer	1	0.6	0	0
Sex				
Female	51	29.3	18	39.1
Male	123	70.7	28	60.9
Highest qualification				
Diploma	42	24.1	8	17.4
Bachelor	97	55.7	14	30.4
Masters	31	17.8	18	39.1
PhD	4	2.3	6	13.0
Years of working experience				
Less than 5 Years	45	25.9	11	23.9
5-9 Years	59	33.9	15	32.6
10-14 Years	38	21.8	6	13.0
15-19 Years	10	5.7	4	8.7
20-24 Years	10	5.7	7	15.2
25 Years or more	12	6.9	3	6.5
Area category of your workplace				
Rural	40	23.0	N/A	
Semi-urban	30	17.2		
Urban	104	59.8		

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5.2.1.2 Self-reported digital competencies of the participants

Table 5.2 illustrates mean scores and the standards deviations for each digital competency domain and each sub-item of the European Digital Competence Framework for Citizens (DigComp2.2) used for the rehabilitation professionals working in clinical and community settings. For the domain with the maximum score of 12 which is the Information and data literacy domain, the mean score was found to be 8.84. For the domains with the maximum score of 16 including digital content creation, safety and problem solving, the mean score varied between 8.44 for digital content creation and 9.72 for safety. For the domain of communication and collaboration with the maximum score of 24. The mean score was found to be 16.60. The overall mean score was 52.12.

Table 5.2: Digital Competencies for clinical rehabilitation professionals

Item	Mean	Standard deviation
1. Information and data literacy (Maximum score: 12)	8.84	2.285
1.1 Browsing, searching and filtering data, information, and digital content	3.14	0.856
1.2 Evaluating data, information, and digital content	2.85	0.867
1.3 Managing data, information and digital content	2.85	0.913
2. Communication and collaboration (Maximum score: 24)	16.60	4.458
2.1 Interacting through digital technologies	3.06	0.851
2.2 Sharing through digital technologies	3.11	0.811
2.3 Engaging in citizenship through digital technologies	2.84	0.921
2.4 Collaborating through digital technologies	2.92	0.856
2.5 Netiquette	2.30	1.082
2.6 Managing digital identity	2.37	1.076
3. Digital content creation (Maximum score: 16)	8.44	3.864
3.1 Developing digital content	2.37	1.124
3.2 Integrating and re-elaborating digital content	2.36	1.127
3.3 Copyright and licences	2.11	1.122
3.4 Programming	1.60	1.192
4. Safety (Maximum score: 16)	9.72	4.028
4.1 Protecting devices	2.42	1.124
4.2 Protecting personal data and privacy	2.51	1.116
4.3 Protecting health and well-being	2.44	1.195
4.4 Protecting the environment	2.36	1.143
5. Problem solving (Maximum score: 16)	8.52	3.538
5.1 Solving technical problems	2.02	1.042
5.2 Identifying needs and technological responses	2.18	1.024
5.3 Creatively using digital technologies	2.06	1.027
5.4 Identifying digital competence gaps	2.25	1.045
Total Score (Maximum score: 84)	**52.12**	**15.384**

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Table 5.3 illustrates mean scores and the standards deviations for each domain and each sub-item of the DigCompEdu used for the rehabilitation professionals working in academic institutions. For the domains with the maximum score of 12 including digital resources, assessment and empowering learners, the mean score varied between 7.02 for assessment and 8.30 for digital resources. For the two domains with the maximum score of 16, the mean score was 10.39 for teaching and learning and 12.41 for the professional engagement. For the domain of facilitating learners' digital competence with the maximum score of 20, the mean score was found to be 12.35. The overall mean score was 57.83.

Table 5.3: Digital Competencies for academic rehabilitation professionals

Item	Mean	Standard deviation
Area 1: Professional Engagement (Maximum score: 16)	12.41	2.247
Using different digital channels to communicate with learners and colleagues whenever appropriate	3.11	0.900
Using digital technologies whenever appropriate to work together with colleagues inside and outside the educational organisation	3.24	0.766
Actively developing digital competence for teaching	2.72	0.807
I am aware of and participate in online training opportunities	3.35	0.526
Area 2: Digital Resources (Maximum score: 12)	8.30	1.896
Using different internet sites and search strategies to find and select a range of different digital resources	3.17	0.677
Creating own digital resources and modify existing ones to adapt them to personal needs	2.15	0.965
Effectively protecting personal data, e.g. exams, learners' grades, learners' personal information	2.98	0.906
Area 3: Teaching and Learning (Maximum score: 16)	10.39	2.637
Carefully considering how, when, and why to use digital technologies in classroom with learners, so that they are used with added value	2.89	0.795
Following learners' activities and interactions in the collaborative online environments used	2.54	0.687
When learners work in groups, they use digital technologies to help them learn and effectively accomplish course tasks	2.78	0.814
Using digital technologies to allow learners to plan, document and monitor their learning themselves	2.17	0.877
Area 4: Assessment (Maximum score: 12)	7.02	2.216
Using digital assessment tools to monitor [student] progress	2.17	0.877
Analysing all data (information) available to me to identify learners who need additional support	2.43	0.910
Using digital technologies to provide effective feedback	2.41	0.933

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Area 5: Empowering Learners (Maximum score: 12)	7.35	2.424
Using digital technologies to offer learners personalised learning opportunities e.g. I give different learners different digital tasks to address individual learning needs, preferences, and interests	2.50	0.888
Considering and addressing potential practical or technical difficulties when creating digital assignments for learners	2.30	0.940
Using digital technologies for learners to actively participate in class or online learning	2.54	0.982
Area 6: Facilitating Learners' Digital Competence (Maximum score: 20)	12.35	4.265
Teaching learners how to assess the reliability of information	2.63	0.974
Setting up course tasks which require learners to use digital means to communicate and collaborate with each other or with an outside audience	2.37	0.928
Setting up assignments which require learners to create digital content e.g. videos, audios, photos, digital presentations, blogs, wikis...	2.33	1.194
Teaching learners how to use digital technology safely and responsibly	2.43	1.003
Encouraging learners to use digital technologies creatively to solve concrete problems e.g. to overcome obstacles or challenges emerging in the learning process	2.59	1.024
Total Score (Maximum score: 88)	**57.83**	**12.421**

The results indicated that for a maximum score of 84, the majority of the rehabilitation professionals in clinical or community settings (65.5%) reported the scores above 47, corresponding to experts (40.8%), leaders (18.4%) and pioneers (6.3%). Similarly, most of the rehabilitation professionals in academic settings (73.9%) reported the scores above 49, corresponding to experts (45.7%), leaders (26.1%) and pioneers (2.2%) (Table 5.4).

Table 5.4: Digital Competencies levels for rehabilitation professionals according to working fields.

Clinical rehabilitation professionals			Academic rehabilitation professionals		
Level	Frequency	Percentage	Level	Frequency	Percentage
Newcomers (A1): < 19	5	2.9	Newcomers (A1): < 20	0	0.0
Explorers (A2): 19-32	13	7.5	Explorers (A2): 20-33	2	4.3
Integrators (B1): 33-47	42	24.1	Integrators (B1): 34-49	10	21.7
Experts (B2): 48-62	71	40.8	Experts (B2): 50-65	21	45.7
Leaders (C1): 63-76	32	18.4	Leaders (C1): 66-80	12	26.1
Pioneers (C2): 77-84	11	6.3	Pioneers (C2): 81-88	1	2.2
Total	174	100.0		46	100.0

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5.2.2 Qualitative results

5.2.2.1 Results from clinical rehabilitation professionals

5.2.2.1.1 Demographic characteristics of the clinical participants

Table 5.5 illustrates the demographic characteristics of the clinical participants. There were FGDs with 4, 8 and 12 rehabilitation professionals from clinical settings in Kenya, Rwanda and Tanzania-Main Land, respectively. There was also a similar FGD with 8 participants in Zanzibar.

Table 5.5: The socio-demographic characteristics of the qualitative clinical participants

ID	Profession	Sex	Area	Qualification
Kenya				
CK01	PT	Male	Urban	Masters
CK02	PT	Male	Urban	Masters
CK03	PT (KSP Official)	Male	Urban	Bachelor
CK04	PT	Male	Urban	Masters
Rwanda				
CRO1	SLT	Male	Urban	Bachelor
CRO2	OT	Male	Rural	Bachelor
CRO3	OT	Male	Urban	Bachelor
CRO4	P&0	Male	Rural	Diploma
CRO5	P&O	Male	Urban	Diploma
CRO6	PT	Male	Urban	Bachelor
CRO7	PT	Male	Urban	Diploma
CRO8	PT	Male	Urban	Bachelor
Tanzania-Main Land				
CTO1	P&O	Male	urban	Masters
CTO2	P&O	Male	urban	Bachelor
CTO3	OT	Female	Urban	Diploma
CTO4	OT	Male	Urban	Diploma
CTO5	OT	Male	Urban	Masters
CTO6	OT	Male	Urban	PhD Candidate
CTO7	PT	Male	Urban	Masters
CTO8	PT	Female	Urban	Bachelor
CTO9	PT	Male	Urban	Masters
CT10	Optometrist	Male	Urban	Bachelor
CT11	Optometrist	Female	Urban	Bachelor
CT12	Optometrist	Male	Urban	Master
Zanzibar				
CZ01	PT	Female	Urban	Diploma

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CZ02	PT	Female	Urban	Diploma
CZ03	PT	Female	Urban	Degree
CZ04	PT	Male	Urban	Diploma
CZ05	PT	Male	Urban	Degree
CZ06	PT	Male	Urban	Masters
CZ07	OT	Male	Urban	Masters
CZ08	OT	Male	Urban	Masters

Abbreviations: OT, Occupational Therapy; P&O, Prosthetics & Orthotics; PT, Physiotherapy.

5.2.2.1.2 Current level of digital competencies

Generally, the participants expressed that the level of digital competencies among rehabilitation clinicians was very low as illustrated by the following quotes:

"I think we are still behind when it comes to digital rehabilitation skills and practices as it is something we have not been using on our ground while it is very important when it comes to the number of rehabilitation professionals, accessibility challenges, and the demands outside there".

"Digital competence is low. Based on my observations here in Kigali, the number of professionals who are using digital tools is still low and the situation is worse in rural areas. The reasons are because rehabilitation professionals are not having enough trainings.

5.2.2.1.3 Contribution of digital competencies to rehabilitation practice

The clinicians provided examples, such as the use of telemedicine and EHRs, to illustrate the practical benefits of digital competencies in enhancing communication, data management, and patient engagement. The response also highlights the empowerment of patients through digital education tools, suggesting a holistic view of digital integration that benefits both clinicians and patients.

These digital competencies directly correlate with improvements in rehabilitation practices, providing concrete examples from personal experience as asked in the FDG, thus demonstrating the practical impact of digital skills in real-world settings.

The participants expressed the digital competencies can contribute to the effectiveness of rehabilitation practice in different ways including reduction of work overload, timely and better rehabilitation services.

"*The demand for rehabilitation services in increasing. The number of clients is increasing while the number of the rehabilitation practitioners is still very low. Imagine you have 20 clients per day! The services won't be good. This digital rehabilitation can be a solution. With it you can provide good services and keep in contact with clients, you can monitor the progress of a patient, how she/he is improving. So, I think this comes at a right time*".

"*As we are implementing 3D printing, it will help us to produce orthopaedic appliances in a short time*".

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" Digital rehabilitation I believe will make rehabilitation more effective due to efficient follow up systems and will also cut some costs and hustles involved when persons are going for therapy sessions from the hospitals and also for the service providers".

" Digital tools like physitrack can improve patient education by providing interactive exercise programs and easily accessible resources, such as instructional videos, apps, and virtual reality simulations. Example: In stroke rehabilitation, I use the apps with video demonstrations of exercises; ensuring patients perform movements correctly and consistently at home".

5.2.2.1.4 Valuable digital tools for rehabilitation practice

The participants provided a detailed list of various digital tools—like telemedicine platforms, mobile apps, wearable devices, VR/AR tools, and monitoring systems—showing a deep understanding of the current digital aids available for rehabilitation. Each tool is linked to its specific advantage in the rehabilitation process, such as increased access, enhanced engagement, and improved outcome monitoring. The clinicians' responses comprehensively address the question by not only listing the digital tools but also explaining why these tools are important, thereby providing a rationale for their integration into practice.

The participants also expressed that the digital tools or resources that are most valuable for enhancing the rehabilitation practice include computers, I-pads, rehabilitation softwares, full internet and electricity coverage.

"A digital phone, tab or a computer, a rehabilitation app or platform and internet connectivity (Wi-Fi or Data Bundles). They are important tools for a clinician and patient to interact or make the digital treatment successful".

"Mobile Health Apps- like physiAPP- can offer exercise routines, reminders, educational materials, and progress tracking. They empower patients to take an active role in their rehabilitation, provide real-time feedback, and facilitate communication between patients and therapists".

"Biofeedback devices measure physiological functions such as muscle activity, heart rate, and brain waves. They help patients become aware of their physiological responses and learn to control them, which can be particularly useful for pain management and stress reduction".

"3D printing can be used to create customized orthotics, prosthetics, and rehabilitation aids. Customization enhances the fit and functionality of these devices, improving patient comfort and outcomes".

"*We need machines, laptops, ipads, softwares that can help us to implement our needs"*
"We need computers, software, internet, electricity,
"For our profession (P&O), we also need filament, software and printer".
" Clients need smart phones, laptops, iPad, and common screens at village or cell level. Then I can provide exercises remotely".

5.2.2.1.5 Challenges in integrating digital technologies in rehabilitation practice

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Most therapists are not very familiar with the concept of digital rehabilitation and have the negative mindset that digital rehabilitation will reduce the available job market. The participants revealed that the challenges in integrating digital technologies in rehabilitation practice include the current healthcare systems, technology illiteracy, resource constraints, data security concerns, clients 'resistance to digital approaches, workflow integration, , and low internet connectivity as illustrated below:

"The first barrier is the healthcare system that does not allow the rehab professionals to start using digital rehabilitation".
"Digital competencies in rehabilitation are still low because most of the therapists have no access to available rehabilitation tools and some settings do not have the digital equipment that can be used to provide rehabilitation services digitally. Digital competence is also still low because of lack of exposure and experience".

"There are other barriers are lack of training in using digital devices and poverty of the clients (not having smart phones or computers).

"There may be lack of reediness, resistance to change from the clinicians and clients may prefer being touched by therapists". In fact, clinicians may be resistant to adopting new technologies due to comfort with traditional methods or scepticism about efficacy. Engaging them early in the selection process of new technologies and demonstrate their clinical benefits. Provide training and support to build confidence and competence. Learning Curve-Clinicians need to invest time and effort to learn how to use new digital tools effectively. Offering comprehensive and continuous training programs, including hands-on workshops, online tutorials, and peer mentoring systems can help. Patient Engagement and Accessibility-Patients might have difficulty using digital tools due to lack of familiarity, technical skills, or access to necessary device. By Design user-friendly interfaces and provide patients with training and support. Ensure technologies are accessible on various devices and consider providing loaner equipment or subsidies for patients in need.

"Another challenge is the limited internet coverage"

5.2.2.1.6 Recommendations for improving digital competencies for rehabilitation practice

Suggestions like continuing education programs, hands-on training, and peer learning emphasize the importance of ongoing professional development and collaborative learning environments. Other recommendations were the sensitisation complains, the development of digital rehabilitation protocols, the integration of digital rehabilitation services in the insurance tariffs, and high quality researches to generate evidence for digital rehabilitation and the recommendation to incorporate technology in formal curricula indicating a forward-thinking approach to preparing future clinicians. The following quotes summarize the participants' recommendations:

"I think rehabilitation professionals would be able to use available tools like computers, ipads, phose, but they need training or orientation about rehabilitation softwares that are available"

"Even the rehabilitation professionals we need to upgrade ourselves. Because some of the rehabilitation professionals are not aware that digital tools and services exist"
"Rehabilitation professionals need more digital knowledge and skills before even we think of implementation, I think it is something of paramount to improve the access to rehabilitation services.

"Awareness workshops showing the benefits from digital rehabilitation are suggested"
"There should be a way of development of protocols for digital rehabilitation. Insurance may also include digital rehabilitation among payable acts".
"There is a need to generate evidence and use it to convince the rehabilitation stakeholders in using digital rehabilitation".
"We need access to digital technology in terms of knowledge and skills on how we can implement digital rehabilitation".

The comprehensive set of recommendations addresses the need to enhance digital competencies systematically and sustainably. It shows an understanding of the multifaceted approach required to elevate digital literacy among rehabilitation professionals.

In general, the responses in the FGD provide a thorough examination of the state of digital competencies in rehabilitation, offering both an assessment of the current landscape and a forward-looking perspective on how to enhance these skills effectively. The detailed and thoughtful answers suggest that the clinicians are not only aware of the importance of digital tools but are also keen on improving their usage for better patient outcomes and professional development.

5.2.2.2 Results from academic rehabilitation professionals

5.2.2.2.1 Demographic characteristics of the academic participants

As shown in table 5.6, there were FGDs with 8, 10 and 12 rehabilitation professionals from academic institutions in Kenya, Rwanda and Tanzania-Main Land, respectively. There was also a similar FGD with 5 participants in Zanzibar.

Table 5.6: The socio-demographic characteristics of the qualitative academic participants.

ID	Profession	Sex	Area	Qualification
Kenya				
AK01	PT	Female	Urban	PhD
AK02	OT	Male	Urban	PhD
AK03	PT (KSP Official)	Male	Urban	Bachelor
AK04	PT Student	Female	Urban	Bachelor
AK05	PT Student	Malle	Urban	Bachelor
AK06	PT Student	Male	Urban	Bachelor
AK07	PT Student	Female	Urban	Bachelor
AK08	PT Student	Female	Urban	Bachelor
Rwanda				
AR01	OT	Male	Urban	Masters
AR02	OT	Male	Urban	Masters

AR03	OT	Female	Urban	Bachelor
AR04	P&O	Male	Urban	Masters
AR05	P&O	Male	Urban	Bachelor
ARO6	P&O	Female	Urban	Bachelor
AR07	PT	Male	Urban	Masters
AR08	PT	Male	Urban	PhD
AR09	PT	Female	Urban	Bachelor
AR10	PT	Female	Urban	PhD
Tanzania-Main Land				
AT01	P&O	Male	urban	Masters
AT02	P&O	Female	Urban	Bachelor
AT03	P&O	Male	urban	Masters
AT04	P&O	Female	urban	Masters
AT05	OT	Male	Urban	Masters
AT06	OT	Male	Urban	PhD Candidate
AT07	PT	Male	Urban	Masters
AT08	PT	Female	Urban	Bachelor
AT09	PT	Male	Urban	Masters
AT10	Optometrist	Male	Urban	Bachelor
AT11	Optometrist	Female	Urban	Bachelor
AT12	Optometrist	Male	Urban	PhD candidate
Zanzibar				
AZ01	PT	Male	Urban	Bachelor
AZ02	PT	Male	Urban	Diploma
AZ03	PT	Male	Urban	Diploma
AZ04	OT	Female	Urban	Masters
AZ05	OT	Female	Urban	Masters

Abbreviations: OT, Occupational Therapy; P&O, Prosthetics & Orthotics; PT, Physiotherapy.

5.2.2.2.2 Current level of digital competencies

The academicians acknowledged the variation in digital competencies among lecturers, highlighting areas needing improvements such as assistive technologies, telerehabilitation, digital assessment tools, and multimedia resources. The recommendation to provide training in these areas directly corresponds to the question about perceived current levels and areas for enhancement as shown below:

"While some believe that our digital competencies need significant enhancement, I think many lecturers are already adept at using essential digital tools and this perception of lacking might stem from a few isolated cases rather than a general trend."

It was also highlighted that the level of digital competences may vary depending on various factors, e.g. the age of the rehabilitation professionals, location or area, availability of the resources and level of the healthcare

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system. Rehabilitation clinicians in more developed regions and countries with modern healthcare systems typically have higher levels of digital competency. It was indicated that younger staff generally possess more digital skills due to exposure from their educational backgrounds, while older staff may struggle due to limited training, as illustrated by the following quotes*:*

"It's important to recognize the digital native new lecturers entering the field who bring a fresh perspective and are inherently skilled in digital methodologies, potentially accelerating the digital transformation in education."

"….It is a challenge, due to individual background, training obtained, for instance those studied in this generation (young) people can cope easily but old staff struggle…." .
"…Young staff may have some level of ICT more that the senior staff as they have had basic package of ICT from secondary schools…." .

5.2.2.2.3 Contribution of digital competencies to rehabilitation education

The academicians listed several ways digital competencies enhance education, including accessibility (e.g., closed captioning, screen readers), remote learning (telerehabilitation), interactive learning (simulations, VR), data analysis, and collaboration. These points illustrate how digital skills contribute to more effective teaching and learning, supported by examples like the use of digital simulations and telerehabilitation platforms as noted below:

A participant said*: "…Use of digital tool in education is useful e.g.: in teaching theoretical modules, rehabilitation departments could benefit from using digital technologies in teaching….".*

During the COVID-19 pandemic, online teaching proved beneficial for theoretical modules and preparation for practical sessions.
A participant expressed*: "…Learning and teaching online was helpful for me as I was able to follow my studies, theoretical modules and for practical modules I was able to watch videos and when the practical sessions (face to face) came I was ready to follow….".*
The participants also indicated the limitations of digital pedagogy and proposed the hybrid model as a solution as illustrated below:
"Despite the advantages of digital tools, relying heavily on technology can sometimes detract from the fundamental hands-on skills that students in rehabilitation need. There's a risk that technology might overshadow critical interpersonal patient interactions."
"However, integrating technology with traditional teaching methods could provide a hybrid model where students benefit from both worlds, ensuring they are well-prepared for diverse clinical situations".

5.2.2.2.4 Valuable digital tools for rehabilitation education

The participants expressed that the various valuable digital tools such as simulation software, interactive apps like Microsoft Teams, Zoom and Google Meet, online assessment tools, video-based learning, online libraries,

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tele and virtual reality rehabilitation platforms, and collaborative platforms were valuable for online teaching and learning. These tools were described as important for their flexibility, interactivity, and accessibility, catering to diverse learning styles and needs as shown below:

"…. we can use Microsoft teams or Zoom for teaching and learning…".

"I've noticed that over-reliance on simulation software can lead to a false sense of confidence among students, who may struggle with the unpredictability of real-world clinical environments."

"To counteract this, educators could use simulation as one part of a broader curriculum that equally emphasizes real-world experience and case study analyses."

5.2.2.2.5 Challenges in integrating digital technologies in rehabilitation education

Resistance to change among senior staff, scepticism about the effectiveness of online teaching and reliance on traditional teaching methods are major challenges, as illustrated by the following quote: *"some senior staff do not use digital technology in their teaching... some are still reluctant to change from their traditional way of teaching to adapting this way of teaching via online platform."*

It was also indicated that the integration of digital technologies is further hindered by inadequate infrastructure including limited internet access and availability of necessary devices, little understanding of digital tools and lack of institutional support: A participant said: *" We have a certain strength in ICT but because of less or inadequate resources like cameras, recorders and others, we are not able teach with technology at an advance level".*
Another participant said: *"The issue isn't always about the lack of skills but rather about the overwhelming pace at which digital technologies evolve. It's unrealistic to expect every lecturer to keep up without substantial institutional support."*

Organizational barriers in terms of financial constraints were highlighted. High costs of acquiring, implementing, and maintaining digital technologies. To mitigate this, we seek funding opportunities through grants, subsidies, and partnerships. Perform cost-benefit analyses to justify investments and prioritize technologies that offer significant clinical and operational benefits. Integration into Workflow- Incorporating digital technologies into existing workflows without disrupting care delivery. By conducting thorough workflow assessments and redesign processes to integrate new technologies seamlessly. Pilot projects to refine integration strategies before full-scale implementation. Policy and Regulation Compliance -Navigating complex regulatory requirements for digital health technologies. Staying updated on regulatory changes and engaged with policy experts to ensure compliance. Advocate for clear and supportive regulations that facilitate the adoption of digital health innovations.

5.2.2.2.6 Recommendations for improving digital competencies for rehabilitation education

The Recommendations for improving digital competencies as expressed by the participants include:

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- Providing refresher courses and training on recommended platforms for both academic staff and students.
- Establishing technical support teams and designate focal persons within departments to assist with ICT issues.
- Addressing infrastructure challenges such as internet accessibility both on and off campus.
- Promoting a shift in attitudes towards the use of ICT in teaching and learning through continuous engagement and support.

The following quotes illustrated the recommendations:

"Regular policy and training for academic staff so that they can use them effectively." – 10th.
"Internet, infrastructure and training limitations should be addressed.".

"While structured training programs are important, they need to be flexible and customizable to individual learning paces. One-size-fits-all approaches can be inefficient and may not address the specific needs of each lecturer."

"An ongoing mentorship program where novice lecturers pair with tech-savvy mentors could also be beneficial in fostering a culture of continuous learning and adaptation to new technologies."

In general, the academician's responses, along with the added perspectives, reflect a deep understanding of the role of digital competencies in rehabilitation education, the tools that can enhance learning, the challenges in adopting these technologies, and strategies for overcoming these challenges and improving lecturer competencies. Each question from the FGD is answered with considerable detail, providing a comprehensive view of the current state and future directions for digital.

6 Discussion

The quantitative results indicate that a significant portion of rehabilitation professionals, both in clinical or community settings and in academic settings, scored above the threshold considered to be indicative of expertise, leadership, or pioneering status in the field of digital competencies. In clinical or community settings, 65.5% of professionals scored above 47, with 40.8% categorized as experts, 18.4% as leaders, and 6.3% as pioneers. Similarly, in academic settings, 73.9% of professionals scored above 49, with 45.7% categorized as experts, 26.1% as leaders, and 2.2% as pioneers. These findings suggest that a significant proportion of rehabilitation professionals possess advanced knowledge and skills related to digital rehabilitation, regardless of whether they work in clinical/community or academic settings. The high percentages of experts and leaders in both settings suggest a strong foundation of expertise and leadership within the field, which bodes well for the advancement and implementation of digital rehabilitation interventions in practice. However, it's worth noting that the digital competences were self-reported.

However, the qualitative results indicated that the level of digital competencies among rehabilitation clinicians was very low, and the variation in digital competencies among lecturers with younger academicians possessing more digital skills due to exposure from their current educational systems with better opportunities in

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technology. The fact that 73.5% of the clinicians versus 60.9% of the academicians who participated in the quantitative survey were aged below 40 years may justify the good digital competency scores which were reported. Self-rating surveys, while valuable tools for gathering subjective data, have several limitations that should be considered while interpreting the survey results:

a. Social desirability bias: Respondents may provide answers that they believe are socially acceptable or desirable, rather than reflecting their true opinions or behaviours. This can lead to inaccurate or biased results, particularly if respondents feel pressured to present themselves in a positive light.
b. Lack of objectivity: Self-rating surveys rely on individuals' perceptions of themselves, which may not always align with objective reality. Factors such as self-esteem, mood, and cognitive biases can influence respondents' self-assessments, leading to inaccuracies or inconsistencies in the data.
c. Limited insight into unconscious biases: Respondents may be unaware of their own biases or may underreport socially undesirable traits or behaviours. This can result in incomplete or misleading information, particularly when assessing sensitive topics or traits.
d. Variability in interpretation: Self-rating scales may be interpreted differently by different individuals, leading to variability in responses. This can make it difficult to compare results across respondents or to draw meaningful conclusions from the data.
e. Inability to capture complex behaviours or experiences: Self-rating surveys typically rely on simplified Likert scales or other rating systems, which may not fully capture the complexity of individuals' experiences, attitudes, or behaviours. This can limit the depth of insight gained from the data and may overlook important nuances or subtleties.
f. Limited generalizability: Self-rating surveys are often based on convenience samples of respondents, which may not be representative of the broader population. This can limit the generalizability of the findings.

In agreement with the FGD results, the literature review of the Digital Competencies of Rehabilitation Professionals in East Africa indicated that the level of digital competencies among East African rehabilitation specialists is very low and there exist several obstacles concerning digital literacy and awareness that require attention. The clinicians who participated in the FGDs revealed that the challenges in integrating digital technologies in rehabilitation practice include the current healthcare systems, technology illiteracy, resource constraints, data security concerns, clients 'resistance to digital approaches, workflow integration, , and low internet connectivity. The academicians also expressed that resistance to change among senior staff, skepticism about the effectiveness of online teaching and reliance on traditional teaching methods are major challenges. They also noted that *the* integration of digital technologies is further hindered by inadequate infrastructure including limited internet access and availability of necessary devices, little understanding of digital tools and lack of institutional support.

The publications included in the literature review of the ePedagogy, and the future of Rehabilitation Professionals in East Africa represent only 4 out of the 13 East African countries but the studies did display some interesting variation with regards to their analysis. All the studies showed that there were gaps in technology implementation and use. Ethiopian doctors used technology tools to teach their courses but do not explore the potential for transformative use of these tools. In the study that examined ICT usage among EAC Undergraduate students demonstrated a significant gap in ICT usage for educational purposes among the students despite

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positive attitudes towards technology. The study on first year students in Rwanda found a significant gap in familiarity with and access to technology among first-year students at the University of Rwanda. Many students have limited or no experience with digital tools and eLearning systems. The study of medical training at a Kenyan medical college found that medical institutions should focus on improving e-learning infrastructure, providing faculty and student training, and incorporating more flexible e-learning activities. Thus, gaps were certainly found in each of the studies.

The publications included in the review span a relatively recent timeline, ranging from 2018 to 2023, but we identified only four studies eligible for the review. This suggests that research on ePedagogy related to digital rehabilitation professionals in East Africa is needed. The relatively recent dates also indicate that there might be ongoing developments in this field that should be continuously monitored and studied to keep up with the rapidly evolving digital landscape (Bonnechère et al., 2023).

7 Conclusion and recommendations

This section consists of conclusion and recommendations.

7.1 Conclusion

The landscape analysis suggested a moderate level of digital competencies among East African rehabilitation specialists, but the results cannot be generalized.

7.2 Recommendations

To enhance the digital competencies of rehabilitation professionals in East Africa, it's essential to involve key stakeholders and collaborate on strategic initiatives. Here are some recommendations tailored to different stakeholders:

Government Bodies and Regulatory Agencies:

- Develop policies and regulations that encourage the integration of digital technologies into rehabilitation practices.
- Invest in improving ICT infrastructure to ensure widespread access to digital tools and resources. This includes providing adequate internet connectivity, computers, and technical support services to facilitate seamless integration of technology in education.
- Provide funding and resources for training programs focused on digital competencies for rehabilitation professionals.
- Establish standards and accreditation processes for digital tools used in rehabilitation to ensure quality and safety.

Institutions of Higher Education (HEIs) in East Africa

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- Enhanced Digital Literacy Programs: Institutions of Higher Education (HEIs) in East Africa should prioritize the development of digital literacy programs for both educators and students. These programs should focus on enhancing digital competence across various domains, including information literacy, communication skills, digital content creation, and safety.
- Update curricula to include courses on digital technologies relevant to rehabilitation practice, such as telehealth, electronic health records, and assistive technologies.
- Provide faculty development opportunities to ensure educators are equipped to teach digital competencies effectively.
- Offer hands-on training opportunities, such as clinical placements or internships, where students can apply their digital skills in real-world settings.

Professional Associations and Organizations:

- Offer continuing education programs and workshops specifically designed to enhance digital competencies.
- Facilitate networking opportunities for rehabilitation professionals to share best practices and learn from each other's experiences with digital technologies.
- Advocate for the inclusion of digital competency requirements in professional certification and licensure processes.

Technology Developers and Industry Partners:

- Collaborate with rehabilitation professionals to co-design and tailor digital tools to meet their specific needs and preferences.
- Provide training and technical support to ensure rehabilitation professionals can effectively use and integrate digital technologies into their practice.
- Offer affordable pricing models or subsidies for digital solutions to make them more accessible to rehabilitation facilities in East Africa.

Healthcare Facilities and Employers:

- Invest in infrastructure upgrades, such as reliable internet connectivity and secure data storage systems, to support the adoption of digital technologies.
- Provide incentives, such as bonuses or professional development opportunities, to encourage rehabilitation professionals to enhance their digital competencies.
- Foster a culture of innovation and continuous learning within the organization to promote the uptake of digital tools and practices.

Researchers

- Continuous monitoring and research efforts are essential to keep pace with the rapidly evolving digital landscape. Researchers should collaborate with policymakers to conduct longitudinal studies and evaluate the effectiveness of digital pedagogy initiatives in rehabilitation education.

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9 Appendices

9.1 Appendix 3.1: Search strategy for the rapid literature review on Digital Competencies of Rehabilitation Professionals in East Africa

Items	Key concepts	Mesh terms	Search strings	Database Hints/ combined with Boolean operators OR, AND, NOT)
1	Digital technology	"Tele-Rehabilitation"	((((((((((((telemedicine) OR (technology)) OR (robotics)) OR (software)) OR ("video game")) OR ("therapy computer assisted")) OR (telerehabilitation)) OR ("digital rehabilitation")) OR (digital rehabilitation assisted technology)) OR ("technology assisted rehabilitation")) OR ("digital technology")) OR ("technology assisted")) OR ("virtual reality")) OR ("mobile application")) OR (wearable devise)	2,093,073
2.	Rehabilitation professionals		((((((((rehabilitation) OR (physiotherapy)) OR (occupational therapy)) OR (speech therapy)) OR (prosthetic orthotics)) OR (rehabilitation professional))	1,128,384

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			OR (rehabilitation doctor)) OR (rehabilitation nurse)) OR (psychologist)	
3.	Digital rehabilitation competences		(((((((digital rehabilitation competence) OR ("clinical competence")) OR (competence)) OR ("professional competence")) OR ("digital competence")) OR (skill)) OR (attitude)) OR (knowledge) OR (rehabilitation professional competence)	2,398,794
3.	East Africa Countries	"Africa, Eastern"	((((((((((((("East Africa") OR (east africa country)) OR (Burundi)) OR (Comoros)) OR (Djibouti)) OR (Ethiopia)) OR (Eritrea)) OR (Kenya)) OR (Rwanda)) OR (Seychelles)) OR (Somalia)) OR (South Sudan)) OR (Tanzania)) OR (Uganda)) OR (Sudan) OR (East Africa Countries) OR ("east Africa")	97,672
4.	Combined		((((((((((((((((telemedicine) OR (technology)) OR (robotics)) OR (software)) OR ("video game")) OR ("therapy computer assisted")) OR (telerehabilitation)) OR ("digital rehabilitation")) OR (digital rehabilitation assisted technology)) OR ("technology assisted rehabilitation")) OR ("digital technology")) OR ("technology assisted")) OR ("virtual reality")) OR ("mobile application")) OR (wearable devise) AND (2013/7/1:2023/6/30[pdat])) AND (((((((digital rehabilitation competence) OR ("clinical competence")) OR (competence)) OR ("professional competence")) OR ("digital competence")) OR (skill)) OR (attitude)) OR (knowledge) OR (rehabilitation professional competence) AND (2013/7/1:2023/6/30[pdat]))) AND (((((((((rehabilitation) OR (physiotherapy)) OR (occupational therapy)) OR (speech therapy)) OR (prosthetic orthotics)) OR (rehabilitation professional)) OR (rehabilitation doctor)) OR (rehabilitation	993

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			nurse)) OR (psychologist) AND (2013/7/1:2023/6/30[pdat]))) AND ((((((((((((("East Africa") OR (east africa country)) OR (Burundi)) OR (Comoros)) OR (Djibouti)) OR (Ethiopia)) OR (Eritrea)) OR (Kenya)) OR (Rwanda)) OR (Seychelles)) OR (Somalia)) OR (South Sudan)) OR (Tanzania)) OR (Uganda)) OR (Sudan) OR (East Africa Countries) OR ("east Africa") AND (2013/7/1:2023/6/30[pdat]))	

9.2 Appendix 4.1: Search strategy for the rapid literature review on ePedagogy of Rehabilitation Professionals in East Africa

Items	Databases	Search strings	Database Hits
1	EBSCOHost: ERIC(?),…	ALL=(“Digital pedagogy” OR “Education technology” OR “E-learning” OR “Online education” OR “ICT in education” OR “Educational technology” OR “Technology-enhanced learning” OR “Digital teaching” OR “EdTech initiatives” OR “Digital learning” OR “Mobile learning” OR “E-learning” OR “Digital literacy” OR “Distance education” OR “E-assessment” OR “Online pedagogy” OR “Digital education” OR “Virtual pedagogy” OR “Web-based instruction” OR “E-pedagogy”)) AND ALL=(“East Africa” OR Burundi OR Comoros OR Djibouti OR Ethiopia OR Eritrea OR Kenya OR Rwanda OR Seychelles OR Somalia OR “South Sudan” OR Sudan OR Tanzania OR Uganda)	530
2.	Web of Science	ALL=(“Digital pedagogy” OR “Education technology” OR “E-learning” OR “Online education” OR “ICT in education” OR “Educational technology” OR “Technology-enhanced learning” OR “Digital teaching” OR “EdTech initiatives” OR “Digital learning” OR “Mobile learning” OR “E-learning” OR “Digital literacy” OR “Distance education” OR “E-assessment” OR “Online pedagogy” OR “Digital education” OR “Virtual pedagogy” OR “Web-based instruction” OR “E-pedagogy”)) AND ALL=(“East Africa” OR Burundi	171

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		OR Comoros OR Djibouti OR Ethiopia OR Eritrea OR Kenya OR Rwanda OR Seychelles OR Somalia OR "South Sudan" OR Sudan OR Tanzania OR Uganda)	

9.3 Appendix 5.1: Questionnaire for rehabilitation professionals in clinical settings

Part 1: Demographic Profile

1.1. What is your profession?

o occupational therapist
o physiotherapist
o prosthetist & orthotist
o speech therapist
o other, please specify: _____

1.2. What is your age category?

o Under 30 years
o 30-39 Years
o 40-49 Years
o 50-59 Years
o 60 or more
o I prefer not to answer

1.3 What is your sex?

o Male
o Female
o I prefer not to answer

1.4. What is your highest qualification?

o Diploma
o Bachelor
o Masters
o PhD

1.5. Years of working experience as a rehabilitation professional:

o Less than 5 Years
o 5-9 Years
o 10-14 Years
o 15-19 Years
o 20-24 Years

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o 25 Years or more

1.6. What is the level of your health facility?

○ Health centre
○ District Hospital
○ Provincial Hospital
○ National Referral Hospital
○ Other, Specify……..

1.7. What is the area category of your workplace?

○ Rural
○ Semi-urban
○ Urban

Part 2: Digital Competencies

Question: Are you able to do the following?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Information and data literacy					
1.1 Are you able to browse, search and filter data, information and digital content?					
1.2 Are you able to evaluate data, information, and digital content?					
1.3 Are you able to manage data, information, and digital content?					
2. Communication and collaboration					
2.1 Are you able to interact through digital technologies?					
2.2 Are you able to share information through digital technologies?					
2.3 Are you able to engage in citizenship through digital technologies?					
2.4 Are you able to collaborate through digital technologies?					
2.5 Are you able to netiquette (communicate on the internet?					
2.6 Are you able to manage digital identity?					
3. Digital content creation					
3.1 Are you able to develop digital content?					
3.2 Are you able to integrate and re-elaborate digital content?					
3.3 Are you able to apply rules of copyright and licenses related to data, digital information, and content?					
3.4 Are you able to do programming?					
4. Safety					
4.1 Are you able to protect devices?					
4.2 Are you able to protect personal data and privacy?					
4.3 Are you able to protect health and well-being?					

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4.4 Are you able to protect the environment?					
5. Problem solving					
5.1 Are you able to solve technical problems?					
5.2 Are you able to identify needs and technological responses?					
5.3 Are you able to creatively use digital technologies?					
5.4 Are you able to identify digital competence gaps?					

Thank you for participating in Digital Competency Survey!

9.4 Appendix 5.2: Questionnaire for rehabilitation professionals in academic settings

Part 1: Demographic Profile

1.1. What is your profession?

O Occupational Therapist
O Physiotherapist
O Prosthetics & Orthotics
O Speech and Language Therapist
O Other, please specify: _____

1.2. What is your age category?

o Under 30 years
o 30-39 Years
o 40-49 Years
o 50-59 Years
o 60 or more
o I prefer not to answer

1.3 What is your sex?

o Male
o Female
o I prefer not to answer

1.4. What is your highest qualification?

o Diploma
o Bachelor
o Masters
o PhD

1.5. Years of working experience as an academic staff:

o Less than 5 Years
o 5-9 Years
o 10-14 Years

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o 15-19 Years
o 20-24 Years
o 25 Years or more

Part 2: Digital Competencies

Question: Are you able to do the following?

Statement	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Area 1: Professional Engagement					
I use different digital channels to communicate with learners and colleagues whenever appropriate (e.g. emails, blogs, educational organisation's website, LMS, Apps)					
I use digital technologies whenever appropriate to work together with colleagues inside and outside my educational organisation					
I actively develop my digital competence for teaching					
I am aware of and participate in online training opportunities					
Area 2: Digital Resources					
I use different internet sites and search strategies to find and select a range of different digital resources					
I create my own digital resources and modify existing ones to adapt them to my needs					
I effectively protect personal data, e.g. exams, learners' grades, learners' personal information					
Area 3: Teaching and Learning					
I carefully consider how, when, and why to use digital technologies in classroom with my learners, so that they are used with added value					
I follow learners' activities and interactions in the collaborative online environments we use					
When learners work in groups, they use digital technologies to help them learn and effectively accomplish course tasks					
I use digital technologies to allow learners to plan, document and monitor their learning themselves E.g. quizzes for self-assessment, ePortfolios for documentation and showcasing, online diaries/blogs for reflection...					
Area 4: Assessment					
I use digital assessment tools to monitor [student] progress					
I analyse all data (information) available to me to identify learners who need additional support					
I use digital technologies to provide effective feedback					
Area 5: Empowering Learners					
I use digital technologies to offer learners personalised learning opportunities e.g. I give different learners different digital tasks to address individual learning needs, preferences and interests					

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When I create digital assignments for learners I take into account and address potential practical or technical difficulties E.g. equal access to digital devices and resources; interoperability and conversion problems; lack of digital skills					
I use digital technologies for learners to actively participate in class or online learning					
Area 6: Facilitating Learners' Digital Competence					
I teach learners how to assess the reliability of information					
I set up course tasks which require learners to use digital means to communicate and collaborate with each other or with an outside audience					
I set up assignments which require learners to create digital content e.g. videos, audios, photos, digital presentations, blogs, wikis...					
I teach learners how to use digital technology safely and responsibly					
I encourage learners to use digital technologies creatively to solve concrete problems e.g. to overcome obstacles or challenges emerging in the learning process					

Thank you for participating in Digital Competency Survey!

9.5 Appendix 5.3: Questions to guide the FGD with clinical rehabilitation professionals

1. How do you perceive the current level of digital competencies among rehabilitation clinicians? What areas do you think need improvement or enhancement?
2. In what specific ways do you believe digital competencies contribute to the effectiveness of rehabilitation practice? Can you provide examples from your own experience?
3. What types of digital tools or resources do you think are most valuable for enhancing the rehabilitation practice? Why do you consider these tools important?
4. What challenges do rehabilitation clinicians face in integrating digital technologies into their rehabilitation practice? How can these challenges be addressed or mitigated?
5. What would you recommend for improving knowledge and skills of the rehabilitation professionals in terms of technologies for rehabilitation?

9.6 Appendix 5.4: Questions to guide the FGD with academic rehabilitation professionals

1. How do you perceive the current level of digital competencies among rehabilitation lecturers? What areas do you think need improvement or enhancement?
2. In what specific ways do you believe digital competencies contribute to the effectiveness of rehabilitation education? Can you provide examples from your own experience?
3. What types of digital tools or resources do you think are most valuable for enhancing the learning experience in rehabilitation education? Why do you consider these tools important?

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4. What challenges do rehabilitation lecturers face in integrating digital technologies into their teaching methods? How can these challenges be addressed or mitigated?
5. What would you recommend for improving digital knowledge and skills of the rehabilitation lecturers?