RADIC

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Educational Handbook of Digital Rehabilitation in Health Care for East African Countries

Content

1 Introduction

In this user guide, we want to give you an overview of this handbook. We want to share with you in what context it was developed, who the authors are, what the vision is, how you benefit from this handbook and introduce you to the content. After reading this handbook, you can navigate through the handbook and use it to your own benefit.
Let us start with the most crucial point: The handbook exists as an online version and can also be downloaded as a pdf. The online version is available via this link: t.b.d. Both versions are identical apart from a few graphical representations.

Context:
This handbook is a product of the multinational Erasmus + project RADIC (Rehabilitation for all through digital innovation and new competencies). RADIC started in March 2023 and runs until February 2026. The overall objective of the project is to contribute towards increased capacity of higher education to support and scale digital transformation in Eastern Africa, with the aim to ensure rehabilitation services for all. The project addresses the rehabilitation need for people living in East Africa with the support of digital transformation as it provides an opportunity to have more accessible and personalized models and system of rehabilitation in Eastern Africa. For more details about the project, follow this link: https://www.jamk.fi/en/project/radic

Authors:
This handbook was developed by the RADIC consortium, which consist of eight higher education institutions from Rwanda, Kenya, Tanzania mainland, Zanzibar, Finland, and Germany.
Please note that the European Commission is not responsible for the content of this handbook. More information about the Erasmus+ program: www.oph.fi/erasmusplus.

Aims of the handbook and target group:
This handbook is intended to be a dynamic resource for teachers and trainers in the field of health and social studies, providing them with the pedagogical tools they need to foster a new generation of health professionals who are able to use digital technologies to improve rehabilitation services. This Handbook is aimed at teachers and trainers who are already familiar with the concept, applications, benefits and challenges of Digital Rehabilitation in East Africa.
If you want to learn more about Digital Rehabilitation in general, take a look at the handbook “Digital Rehabilitation in East Africa”. This handbook covers the basics of the topic. You can access the handbook via the following link https://www.jamk.fi/en/project/radic/Handbook-of-digital-rehabilitation-in-health-care-for-east-african-countries

Content of the handbook:
In this handbook you will find a guideline on the following content:

- **Guiding principles for teaching:** providing a basic understanding of Digital Rehabilitation and explaining the competences and skills needed to successfully apply Digital Rehabilitation in practice.
- **Organizational and digital resources:** guideline for creating organizational prerequisites for digital teaching.
- **Learning methods:** exploring different learning strategies that meet different educational needs and enhance the learning experience.

- **Teaching methods:** methods to instruct students in the use and application of digital Rehabilitation.
- **Co-creation methods:** collaborative techniques that engage students and stakeholders in the co-creation of learning experiences and digital solutions.
- **Assessments:** tools and strategies for evaluating student progress and the effectiveness of Digital Rehabilitation interventions.
- **Good pedagogical practices:** good practices and exemplary models of pedagogy that have been developed by the RADIC consortium.

Navigate through the handbook:
The handbook consists of six chapters. Although the chapters do not necessarily build on each other, we recommend that you go through all chapters of the handbook in the order in which they are provided to get a comprehensive picture on how you can incorporate content on the topic of Digital Rehabilitation into teaching.
Each chapter is structured in the same way. First, the topic of the chapter is explained in a brief introduction. This is followed by the main content of the chapter divided into sub-chapters. At the end, all chapters have a list of references.

Finally, yet importantly - please read the following terms of use:

Now you are perfectly prepared to read and work with the handbook!

In case you have questions or suggestions concerning this handbook, please contact us via: https://www.jamk.fi/en/project/radic/radic-contact-information

Your RADIC consortium

2 Guiding principles

2.1 Introduction to Digital Rehabilitation

Digital Rehabilitation refers to a suite of interventions that utilize digital tools, technologies, and services to optimize functioning, reduce disabilities, and monitor health status in individuals with health issues. This approach incorporates software applications, artificial intelligence, and devices like smartphones and tablets to enhance the rehabilitation journey. By managing client interactions with healthcare providers, monitoring progress, and facilitating personalized therapy programs, Digital Rehabilitation distinctly focuses on the rehabilitation process rather than broader health services.

The implementation of Digital Rehabilitation is a collaborative decision between healthcare professionals and clients, ensuring that interventions align with the client's needs and daily life. This blend of self-managed rehabilitation with professional guidance offers a flexible and effective rehabilitation process (Arntz et al., 2023; RADIC, 2024).

Digital Rehabilitation originated in the late 20th century with early developments in computer-assisted therapy for neurological rehabilitation. The Rehabilitation Institute of Chicago pioneered these technologies in the 1980s. The 1990s saw the introduction of Virtual Reality (VR) systems, which created immersive therapy environments for clients with conditions such as stroke and spinal cord injuries (Radic, 2024). Since the 2000s, advancements in VR, Augmented Reality (AR), robotics, sensors, and AI have significantly expanded the possibilities for personalized and effective rehabilitation.

The future of Digital Rehabilitation looks promising, with machine learning and data analysis poised to further refine therapy programs. Telemedicine and remote monitoring are expected to enhance accessibility, particularly in underserved regions. Digital Rehabilitation offers numerous benefits for clients, healthcare professionals, and the healthcare system. For clients, it provides accessible rehabilitation options, especially for those facing barriers like cost, transportation, or stigmatization. Digital tools offer continuous access to health information and support, fostering greater control over personal health (Arntz et al., 2023; RADIC, 2024).

For healthcare professionals, digital solutions enable better client monitoring and quick adaptation of treatments. Enhanced communication through digital platforms supports personalized care. Additionally, healthcare providers benefit from streamlined processes such as online registration and billing.

These concepts of Digital Rehabilitation are central aspects for future care and should be encountered using this handbook, as it aims to support and reinforce a better understanding of Digital Rehabilitation for all learners e.g. your students.

2.2 Competences for Digital Rehabilitation

The Framework for Digital Rehabilitation Competences in East Africa (FDRC-East Africa) outlines the essential aspects of Digital Rehabilitation in the region, with the aim of increasing access to rehabilitation and improving the quality of care. It covers the necessary competences, digital activities, and behaviors required by the rehabilitation professionals to effectively deliver and support rehabilitation services, encompassing both digital and non-digital components throughout the entire rehabilitation process.

This FDRC-East Africa is intended to serve as a guide for teaching and practice. The FDRC-East Africa is applicable to all rehabilitation disciplines and settings in East Africa, serving to clients of all ages receiving physical and mental rehabilitation. The framework was developed through an iterative process within the RADIC-project, with input from relevant stakeholders such as rehabilitation professionals, educators, and students, as well as the sources mentioned.

The framework is organized around four dimensions: Health, Education, Livelihood & Social, and Empowerment and is linked to the Community-based Rehabilitation Indicators Manual (WHO, 2015). The dimensions describe the outcomes that rehabilitation professionals successfully achieve through Digital Rehabilitation interventions. To achieve the outcomes, the dimensions are linked to key competences in rehabilitation and digital activities (WHO, 2020; Voarikari et al., 2022; Punie & Redecker, 2017). For this purpose, the four competency domains are defined and mapped to behaviors that the rehabilitation professional should demonstrate. The competences are complemented with activities and tasks that health professionals should perform in the rehabilitation process in order to successfully apply (digital) rehabilitation.

The framework for Digital Rehabilitation Competences in East Africa is based on the following sources:

- Community-based Rehabilitation Indicators Manual (WHO, 2015)
- Rehabilitation Competency Framework (WHO, 2020)
- DigComp 2.2. - the Digital Competence Framework for Citizens (Voarikari et al., 2022)
- DigCompEdu - European Framework for the Digital Competence of Educators (Punie, 2017)
- Needs assessment WP01 RADIC-project
- Landscape analysis WP02 RADIC-project
- Curricula Mapping WP04 RADIC-project

2.3 Framework for Digital Rehabilitation Competences in East Africa (FDRC-East Africa)

	Health (digital service)	
Outcomes	Clients of rehabilitation - have equal access to health services and participation in digital activities necessary to achieve the highest possible standard of health - know how to achieve good levels of health and participate in digital activities contributing to their health - participate in digital activities that prevent illness and disease - engage in planning and carry out Digital Rehabilitation activities with the required services - have access to suitable digital tools, can use them and know how to use them in everyday life	
Competences	**Competences and activities for Digital Rehabilitation**	
1. Practice	Competences and activities related to (digital) interaction between rehabilitation professionals, the client and family. Competences and (digital) activities include those necessary for establishing appropriate digital driven working relationships, assessment, planning, delivering and monitoring digital driven interventions. They use adequate decision-making and problem-solving for the entire Digital Rehabilitation process.	
	Key competences:	**Behaviors**
	1. Places the client and their family at the center of practice	Supports the client and their family to be active partners in their rehabilitation, including decision-making
		Seek (digital) support to adapt practice towards the desired outcome of the client and their families responding to their needs, preferences, goals and circumstances
		Seeks (digital) support to recognize and address barriers to the client and their family's engagement in rehabilitation, including their ability to access services
	2. Communicates effectively with the client, their family, and their health-care team	Adapts communication to a range of needs and practices, including through the use of interpreters, assistive technology, and relevant accommodations
		Manages the environment to support effective communication, taking into consideration noise, privacy, comfort and space
	3. Adopts a rigorous approach to problem-solving and decision-making	Identifies personal, environmental, and health factors and seeks support to use them in conceptualizing problems and identifying solutions
		Seeks support to identify innovative approaches to addressing challenges with a client and their family
	4. Integrate evidence in practice	Maintains an awareness of current evidence-based practice
		Follows current evidence-based guidelines and protocols
	5. Works within scope of practice and competence	Seeks support and guidance when encountering situations beyond scope of practice and competence
	Digital activities:	**Tasks**

	1. Obtaining an environment for (digital) rehabilitation	Providing basic explanations of what may be involved in the client's (digital) rehabilitation, including potential benefits and harms, in the context of routinely delivered interventions
		Clarifying the understanding of, and expectations for, (digital) rehabilitation of the client and their family
		Articulating information needs, searching for data, information and content in digital environments, accessing them and navigating between them, inclusive information retrieval
		Managing strategies to access digital resource
		Confirming consent according to legal and/or organizational policy
	2. Conducting (digital) rehabilitation assessments	Obtaining a basic health, environmental and personal history, clearly relevant to the needs of the client and their family
		Conducting routine and basic assessments of body structures and functions
		Identifying typical barriers and facilitators in the client's environment
		Conducting basic assessments of the client's performance in relevant activities and their participation in meaningful events and life roles
		Assessing (digital) resources and make choices what resources to include in the rehabilitation process
	3. Developing and adapting (digital) rehabilitation plans	Identifying rehabilitation goals with the client and their family based on their priorities and expectations and the service context
		Identifying (digital) rehabilitation interventions required to address the goals of the client and their family
		Participating in the development and coordination of interprofessional rehabilitation plans
	4. Implementing (digital) rehabilitation interventions	Providing the client and their family with customized education and training to promote self-efficacy and self-management
		Providing and guiding the client and their family in the use of (digital) assistive products, constructing and/or modifying them according to needs
		Identifying and facilitating innovative modifications to the client and their family's environment to improve (digital) safety, (data) privacy, access and functioning
		Using preventative, restorative and compensatory exercises, techniques and physical modalities
		Development of digital content and integration into rehabilitation
	5. Using evidence	Using approaches to evidence implementation in practice

	6. Evaluating progress towards desired outcomes	Using evaluation measures, also including data evaluation to assess progress towards desired outcomes
		Analyzing, interpreting and critically evaluating the data, information and digital content
	7. Discharging and ensuring appropriate continuity of care	Following-up with the client and their family after discharge, initiating further routine services if necessary
		Organizing, storing and retrieving data, information, and content in digital environments
		Establishing a discharge plan with the client and their family

	Education (in a Digital Rehabilitation setting)	
Outcomes	Clients of rehabilitation - participate in a variety of learning opportunities based on their needs and desires - make use of learning opportunities to improve their health skills and health conditions - experience equal opportunities to participate in learning opportunities that meet their needs and respect their rights	
Competences	**Competences and activities for Digital Rehabilitation**	
2 Learning & Development	Competences and (digital) activities related to a digital driven development of the rehabilitation professional themselves and others. Competences and activities within this domain involve continuous professional development, teaching and learning.	
	Key competences:	**Behaviors**
	1. Continues to learn and develop	Reflects on practice, seeking support to identify alternative approaches and their implications
		Applies learning to practice with support as needed
		Seeks and reflects on feedback, amending performance accordingly, with support as needed
	2. Supports the learning and development of others	Identifies opportunities for learning according to the needs and preferences of the learner(s)
		Shares information and practices in terms appropriate to the needs of the learner
	3. Works to strengthen rehabilitation education and training	Encourages and motivates others in the pursuit of ongoing learning and development
		Advocates for expanded opportunities for rehabilitation education and training
	Digital activities:	**Tasks**
	1. Supervising and teaching others	Appraising the learning needs of others in the context of (digital) rehabilitation
		Initiating and leading education and training (digital) activities
		Providing constructive feedback
	2. Creatively using digital technologies	Using digital tools and technologies to create knowledge and to innovate processes and products
		Planning and developing a sequence of understandable digital instructions to perform a specific task
		Being aware of behavioral norms and know-how while using digital technologies and interacting in digital environments
		Adapting communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments
	3. Integrating and re-elaborating digital content	Modifying, refining and integrating new information and content into an existing body of knowledge

	Livelihood + Social (in a Digital Rehabilitation context)	
Outcomes	Clients of rehabilitation - acquire skills on an equal basis with others through a range of inclusive training opportunities - have access to digital service on an equal basis with others - access formal and informal social protection measures they need - access and control the way needed personal assistance is provided	
Competences	**Competences and activities for Digital Rehabilitation**	
3 Professionalism	Competences and (digital) activities related to professional integrity, collaboration, (digital) safety and privacy as well as quality of care, that enable a digital driven performance of the professional role.	
	Key competences:	**Behaviors**
	1. Demonstrates ethical conduct	Complying with professional standards, legal regulations and organizational procedures and guidelines
		Seeking support to identify and managing real or potential conflicts of interest
	2. Maintains professionalism	Manages professional boundaries with colleagues and stakeholders
		Employs strategies and seeks support to maintain own health and well-being
	3. Works collaboratively	Sharing and seeking information with/from relevant colleagues and external stakeholders
		Cooperating with others across disciplines, roles, cultures and organizational hierarchies
		Working respectfully and constructively, seeking support to prevent and resolve conflict
	4. Manages professional responsibilities	Prioritizing and managing workload with support as needed
		Adapting to uncertainty and change, seeking support when needed
	Digital activities:	**Tasks**
	1. Managing risks and hazards	Conducting basic assessments of routine hazards and risks
		Reporting hazards, incidents and errors and solving technical problems
	2. Interacting through digital technologies	Interacting through a variety of digital technologies and understanding appropriate digital communication means for a given context
	3. Undertaking quality improvement initiatives	Contributing to quality improvement activities as directed
	4. Participating in team forums	Contributing to team meetings and interprofessional case conferences
		Participating in society through the use of public and private digital services

		Seeking opportunities for participatory citizenship through appropriate digital technologies
	5. Advising on rehabilitation	Addressing questions and concerns about rehabilitation

	Empowerment (in a Digital Rehabilitation context)	
Outcomes	Clients for rehabilitation - make informed choices and decisions - use communication skills and resources (including supportive decision-making) to facilitate interactions effectively - play a catalyzing role in mobilizing key community stakeholders to create an enabling environment - engage in and benefit from self-help groups in local communities	
Competences	**Competences and activities for Digital Rehabilitation**	
4 Management & leadership	Competences and (digital) activities related to teamwork, strategic thinking, management, service development and evaluation, resource management and data protection.	
	Key competences:	**Behaviors**
	1. Works to enhance the performance of the rehabilitation team	Recognizes and values the roles and contributions of team members
		Engages in and supports teamwork
		Encourages others to provide quality practice according to rehabilitation core values and beliefs
	2. Works to enhance the performance of rehabilitation service delivery	Recognizes and promotes the needs and preferences of the population in service delivery
		Contributes to the development of and promotes a shared vision for service delivery
		Recognizes the environmental context of service delivery
		Recognizes the impact of system and structural inequalities on service delivery
		Engages in efforts to strengthen and integrate rehabilitation in the health system
		Being aware of the environmental impact of digital technologies and their use
	3. Acts as a rehabilitation advocate	Participating in initiatives to promote rehabilitation provision for all who need it
		Promoting the role and value of rehabilitation within the immediate environment
		Encouraging and supporting people to advocate for their rehabilitation needs
	Digital activities:	**Tasks**
	1. Managing digital approaches in a rehabilitation team	Allocating digital tasks and responsibilities, with support as needed
		Assisting in the establishment of lines of accountability and support digital structures for team members
		Utilizing and providing input on mechanisms to support team communication
		Using digital tools and technologies for collaborative processes

	2. Managing rehabilitation (digital) service delivery	Contributing to the identification of service goals and objectives
		Sharing data, information and digital content with others through appropriate digital technologies
		Complying with and providing input on policies and procedures for safe and inclusive service delivery
	3. Identifying (digital) needs	Assessing needs and possible technological responses
		Supporting others with their digital competence development
	4. Monitoring and evaluating (digital) rehabilitation service delivery	Identifying, evaluating, select and using digital tools
	5. Protecting personal data and privacy	Protecting personal data and privacy in digital environments
		Understanding how copyright and licenses apply to digital information and content
		Understanding how to use and share personally identifiable information while being able to protect oneself and others from damages
	6. Protecting health and well-being	Being able to avoid health-risks and threats to physical and psychological well-being while using digital technologies
		Being able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying)
		Being aware of digital technologies for social well-being and social inclusion

3 Organizational and digital resources

Today, educators are faced with an abundance of digital (educational) resources to use for teaching. A challenge for any educator is to effectively identify the resources that fit his or her learning objectives, learner group and teaching style (Purnie, 2017). When developing a course for Digital Rehabilitation, the educator needs to think about some organizational aspects and available resources.

3.1 Infrastructure for digital learning

The first thing to consider when developing a digital course is which learning environment is available. So-called Learning Management Systems (LMS) support the learner in the learning process. A LMS is a software that can be used to create, manage and distribute digital teaching content. The LMS such as Moodle or Canvas provides various tools for learning. All course materials, assignment and content can be stored, students have access to the learning materials anytime and anywhere, which supports the different learning styles. LMS encourage collaboration among the students and between students and teachers. Learners can communicate and collaborate with each other through synchronous (e.g. chat) or asynchronous (e.g. discussion forum) communication tools (Arnold et al., 2015).

The challenge for the LMS is that educators need to structure the wealth of materials in a user-friendly and intuitive way. The structure of the LMS must enhance the students' engagement with the LMS tools. An interactive design of the LMS is one of the most important features of effective LMS use. A user-friendly structure, avoiding too many tools and links, respecting copyright rules, when using, modifying and sharing resources, and supporting privacy, are important factors that influence user engagement (Zanjani et al., 2017).

The LMS can be used for different types of feedback mechanisms for the learners. LMS platforms can facilitate peer feedback, where students evaluate each other's work. Teachers can provide detailed feedback on assignments and exams. Quizzes and tests can provide immediate feedback and help learners understand their mistakes. Interactive feedback can also be provided in chats or discussion forums. (Read more about LMS: https://itechcraft.com/blog/learning-management-system-development/).

Furthermore, the students learn to work with a digital tool that can support their understanding of using digital tools in their professional life. Regardless of the LMS, the existing infrastructure of computers connected to the Internet should also be used for digital learning.

3.2 Basic scenarios for virtual learning

When developing digital learning, the scope of digital teaching needs to be considered. In principle, the designs for virtual learning scenarios can be divided into three levels, depending on the degree of virtualization. Digital media can be used as a supplement to face-to-face teaching, through partially virtual blended learning scenarios, to fully virtual events such as Massive Open Online Courses (MOOCs) (Arnold et al. 2015).

Level 1: Enriching face-to-face teaching

Digital media can be used in a variety of ways to enhance the classroom experience. In face-to-face teaching digital slides can be directly linked to digital media such as videos, animations, and simulations to optimize visualization. Alternatively, digital voting systems, small tasks, or feedback tools can be integrated into lectures by using an application on mobile devices (Arnold et al. 2015). In the

classroom, mobile devices and mobile applications (apps) make it possible to situate learning in new physical and social contexts and open up opportunities for exploratory learning. For example, augmented reality (AR) and virtual reality (VR) are growing in importance, and real places and scenarios can be augmented with additional information relevant to learning. Some applications require additional accessories, such as special glasses (Craig, 2013).

Level 2: Blended learning

Blended learning refers to the didactically meaningful combination of face-to-face phases and self-directed learning with e-learning elements (Sauter, 2004). Blended learning is an integrated learning concept that makes optimal use of multimedia learning methods in combination with more traditional methods in a learning arrangement that builds on and complements each other. The blended learning concept helps to promote self-directed learning (see 4.1.1), can be arranged flexibly in terms of location, and responds to people's different learning needs (Kerres, 2016).

Level 3: virtual courses

The third level takes place entirely in a virtual learning environment. Virtual courses can include synchronous elements, such as online lectures or chats, alternating with asynchronous elements, such as provided learning materials, forum discussions, and collaboration in WiKis. They can also be entirely asynchronous. Massive Open Online Courses (MOOCs) are a new form of purely online events with many participants (Arnold et al. 2015).

3.3 Structural and organizational aspects

Once it is, clear what kind of basic scenarios for digital teaching have been chosen, further structural and organizational aspects determine the next steps. To develop a user-friendly course structure several structural and organizational aspects must be considered. Define what learners are expected to learn and achieve by the end of the course. The learning objective should be specific, measurable, achievable, relevant and time-bound. Ensure that the course content aligns with the overall curriculum and program objectives. The course description clearly reports the number of credits, workload, learning outcomes and assessments (Arnold et al., 2015). The choice of learning methods (e.g., lectures, readings, videos, interactive simulations) depends on the content and the competences to be achieved. This educational handbook focuses on appropriately management and orchestration of digital teaching interventions. To do this, integrate various active learning strategies such as group discussions, problem-solving activities, and case studies that promote Digital Rehabilitation in your course development (Purnie, 2017). Design for this learning activities that encourage collaboration among the students (read more in section 4.1).

Develop a clear schedule for the course, including deadlines for assignments and dates for exams. Communicate this schedule to learners in the LMS and in the course at the beginning of the module (Arnold et al., 2015). Once the formal framework for course development has been established, several conditional factors need to be considered. Depending on where the learners are in their studies (beginning, middle, or end), it will be necessary to consider the learners' prerequisites. What prior knowledge and skills do the learners have? What cultural backgrounds and religious issues need to be addressed? These conditional factors need to be considered individually so that they can be applied in a supportive manner (Govindasamy, 2001).

3.4 Managing, protecting and sharing digital resources

When designing the LMS interactively, it is important to properly manage, protect and share digital resources to ensure that data security and user privacy are guaranteed at all times (Purnie, 2017). It is important for learners to know which rights individuals have in a learning platform, such as read and write rights. Who can read the chat logs? Who has access to the work results? Who can view test and exam results? Take measures to protect sensitive data and resources (Purnie, 2017). Set appropriate access permissions to ensure that only authorized users can access or modify digital resources.

The LMS generates large amounts of data. Ensure that digital resources comply with copyright laws and licensing agreements. Provide clear information about usage rights and restrictions for all shared resources. Integrate collaboration tools such as discussion forums, group workspaces, and real-time editing to facilitate resource sharing and collaborative learning (Vuorikari et al., 2022). All of this must be done in compliance with country-specific guidelines on data protection and privacy policies. Moreover, LMS-administrators conduct regular audits of the LMS to check for potential security vulnerabilities, access permissions, and compliance with policies.

4 Teaching and Learning (for Digital Rehabilitation)

In this handbook, we use the definition of digital competence that follows the key competences for Lifelong Learning of the Council Recommendations in 2018 (Vuorikari et al., 2022).

> "Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking." (Council Recommendation on Key Competences for Life-long Learning, 22 May 2018, ST 9009 2018 INIT).

This definition is integrated into our framework for Digital Rehabilitation Competences in East Africa. In the next section, we focus in on the teaching and learning process in this context. The use of e-learning environments in Digital Rehabilitation for adult learners requires an understanding of the unique characteristics and needs of adult learners. Therefore, we apply the basic principles of adult learning that should be considered when developing e-learning content and environments and supporting lifelong learning.

4.1 Learning methods to facilitate learners' digital competences

Different learning approaches can facilitate learners' digital competences. The philosophy of the learning and teaching methods are based on adult learning principles and support the lifelong learning (Collins, 2004). The fundamentals of adult learning methods accumulate and combine life experience and prior learning with new information. Adults are autonomous and self-directed. They are goal-oriented and active participants in the learning process. Learning is facilitated through collaborative, authentic problem-solving activities. Learning is enhanced when they create connections among participants. Adults learn more effectively when they receive timely and appropriate feedback and reinforcement of learning (Collins, 2004). The learning methods presented below were selected from the literature and based on the feedback from the needs of RADIC's project partners. All the learning methods are based on these principles of adult learning.

4.1.1 Self-Directed Learning

To enable lifelong learning health professionals, need to manage their own learning by actively taking control of learning activities or self-directed learning. Based on social constructivist, and social cognitive learning theories, educational approaches should be used that emphasize the student's active participation in learning, and develop knowledge and skills in the context in which they are applied (Van Lankveld et al., 2019). Learners must take responsibility for their own learning. E-learning platforms should provide opportunities for learners to set their own goals and choose their learning paths (Purnie, 2017).

In self-directed learning, learners initiate their own learning process, identifying what they need to learn and seeking resources and opportunities. Teachers encourage the learners to make decisions about their learning activities, timelines, and enhancing self-efficacy beliefs. Self-efficacy is highly relevant for learner self-regulation, or the degree to which learners are responsible participants in their own learning process (Van Lankveld et al., 2019). Self-efficacy could also refer to the learners' confidence in his or her abilities to meet the challenges of Digital Rehabilitation.

Self-directed learning also encourages through intrinsic motivation, while focus in on interesting subject, personal growth continuing professional development (Dahal & Bhat, 2023). Feedback mechanism like self-assessments (see chapter 5) helps learners to understand their strength and areas of improvement.

4.1.2 Experiential learning

Experiential learning integrates real-world examples and experiential problem-solving activities into the learning process. By engaging learners in hands-on experience and reflection, they are better able to connect theories and knowledge learned in the classroom to real-world situations.

David Kolb described the ideal process of learning in a four-step Experiential Learning Cycle. Learning takes place through [https://experientiallearninginstitute.org/what-is-experiential-learning/]:

1. Experiencing (Concrete Experience): Learning begins when a learner uses senses and perceptions to engage in what is happening now.
2. Reflecting (Reflective Observation): After the experience, a learner reflects on what happened and connects feelings with ideas about the experience.
3. Thinking (Abstract Conceptualization): The learner engages in thinking to reach conclusions and form theories, concepts, or general principles that can be tested
4. Acting (Active Experimentation): The learner tests the theory and applies what was learned to get feedback and create the next experience.

Each loop of the learning cycle shapes the next attempt at the task (see fig. 1). Teachers need to incorporate various interactive activities (e-activities) such as simulations and real-world examples, to build on learners' previous experiences. This can empower learners to take charge of their own learning and development.

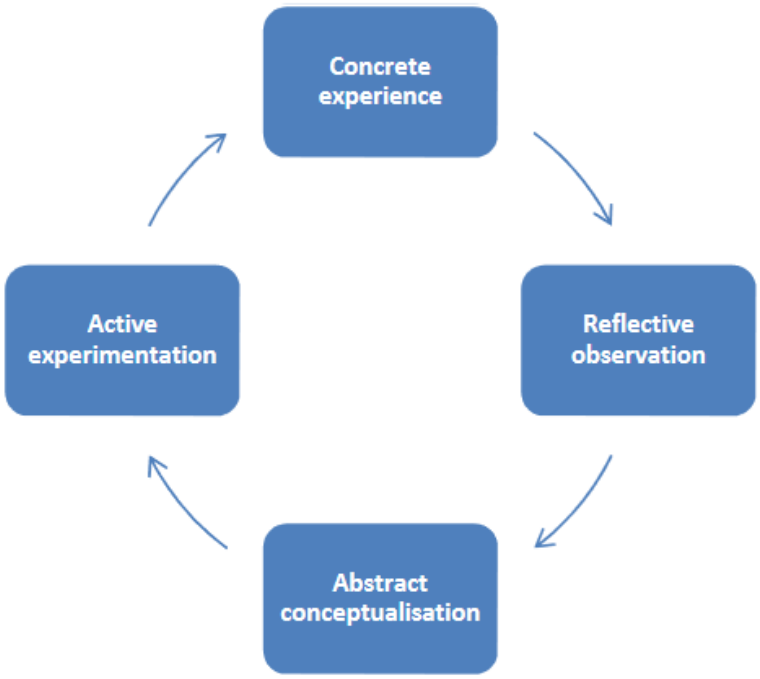

Fig. 1 Kolb's learning cycle

4.1.3 Problem-Centered Learning

A problem-centered learning approach built the knowledge through the students' active participation in the learning process. Problem-centered learning involves complex learning issues from real-world problems (cases) and makes that learner's want to solve them. This makes the content is making relevant by using collaborative, authentic problem-solving activities and by linking theory to practice (Collins, 2004). The best-known approach is problem-based learning (PBL). PBL is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem. This problem is what drives the motivation and the learning. PBL promote the development of critical thinking skills, problem-solving abilities, and communication skills (Yew & Goh, 2016). Read more in section 4.2.3.

4.1.4 Reflective Learning

Reflection is usually part of the learning process and has been identified as an important competency through Donald Schön's book, the "Reflective Practitioner – How professionals think in action". Reflective practice is the ability to reflect on one's actions in order to engage in a process of continuous learning. Reflection is an integral part of all learning methods. It can be seen explicitly how to encourage learners to engage in reflective practice, where they consider what they have learned, how they have learned, and how they can apply this knowledge in the future. Different models of reflection can help to deepen the learning process. Learn more in the reflection toolkit (https://libguides.cam.ac.uk/reflectivepracticetoolkit/models).

4.1.5 Collaborative Learning

Collaborative learning (CL) is an educational approach to teaching and learning that involves groups of learners working together in small groups to solve a problem, complete a task, or create a product. Different benefits are identified (Laal & Ghodsi, 2012):

1. Social benefits;
    - CL helps to develop a social support system for learners;
    - CL leads to build diversity understanding among students and staff;
    - CL establishes a positive atmosphere for modelling and practicing cooperation, and;
    - CL develops learning communities.
2. Psychological benefits;
    - Student-centered instruction increases students' self-esteem;
    - Cooperation reduces anxiety, and;
    - CL develops positive attitudes towards teachers.
3. Academic benefits;
    - CL Promotes critical thinking skills
    - Involves students actively in the learning process
    - Classroom results are improved
    - Models' appropriate student problem solving techniques
    - Large lectures can be personalized
    - CL is especially helpful in motivating students in specific curriculum

4.2 Teaching Methods

The following teaching methods integrate the elements of the learning methods described in chapter 4.1. It brings in different dimensions of the fundamentals of adult education and connects them with principles of lifelong learning. It also takes into account the landscape analysis of WP02 RADIC project and the curricula mapping of WP04 RADIC project, as well as the feedback from the project partners. There is no clear dividing line between the different learning methods. However, this is not the purpose of this manual. Rather, it is about identifying appropriate teaching methods for modules of Digital Rehabilitation.

4.2.1 Flipped Classroom

The Flipped Classroom is an educational approach that reverses the typical in-class and homework elements of a course. Preparratory materials are embedded in the Learning Management System (LMS). Students are first exposed to new material outside of class, usually through reading or videos. These materials facilitate pre-class learning and encourage active engagement, for example through problem solving or discussion during in-class activities (Baig & Yadegaridehkordi, 2023). These activities are supported by peers and teachers. The flipped classroom is a form of blended learning, which refers to any form of education that combines face-to-face instruction with computer-mediated activities.

The benefits of the flipped classroom show that students exposed to flipped classrooms developed better self-directed learning and critical thinking skills. It creates a more active and engaging learning environment by moving passive content learning out of the classroom and using class time for interactive activities. However, it also presents challenges, including the need for significant preparation, potential technological barriers, and varying levels of student readiness and motivation (Baig & Yadegaridehkordi, 2023).

Read more:

- https://docs.google.com/document/d/1arP1QAkSyVcxKYXgTJWCrJf02NdephTVGQltsw-S1fQ/pub#id.wdxrpadvxcrm
- https://cft.vanderbilt.edu/guides-sub-pages/flipping-the-classroom/
- https://www.celt.iastate.edu/instructional-strategies/teaching-format/blended-learning-and-the-flipped-classroom/
- https://projects.iq.harvard.edu/flippingkit/more-resources
- https://www.adelaide.edu.au/flipped-classroom/the-flipped-classroom-explained

4.2.2 Case-Based Learning

The application of basic Digital Rehabilitation knowledge to specific client cases is a core element of rehabilitation, both as a discipline and as a practice. As a result, instructional approaches like case-based learning (CBL) have become essential components of many medical curricula, representing fundamental methods for educating future practitioners in their new profession. Despite the existence of various forms and didactic designs of CBL, a core element of this format is a teacher-guided discussion of a client case. During these discussions, students collaboratively apply learned principles and data analyses, evaluating the usefulness of various strategies to achieve optimal resolutions for the problems posed. This makes CBL a highly interactive seminar format in several respects.

First, an experienced educator guides students through a clinical case, activating their basic knowledge and engaging them in clinical reasoning processes, mainly through asking questions. These questions may clarify students' understanding of different phenomena, address the clinical management of specific clients, and consider the therapeutic consequences of diagnostic evidence (Gartmeier et al., 2019). Second, through their answers and the questions they pose themselves, students actively influence how a clinical case is discussed and analysed (Gade & Chari, 2013). Third, clinical educators also use peer-learning methods, such as small group discussions, as highly interactive didactic elements. During these periods, students form groups to discuss and make sense of the outcomes and consequences of diagnostic procedures (Irby, 1994).

Case-based learning has been shown to be effective in health professional education, as it fosters self-directed learning and the development of soft skills, such as communication and teamwork (Thistlethwaite et al., 2012). Additionally, the interactive nature of CBL supports teacher learning and improves student outcomes by promoting a deeper understanding through classroom discourse (Kiemer et al., 2014).

Read more:

- https://www.queensu.ca/ctl/resources/instructional-strategies/case-based-learning
- https://www.davinci-ed.com/resources/case-based-learning-cbl-in-the-online-classroom
- https://www.bu.edu/ctl/ctl_resource/case-based-learning/

4.2.3 Problem-Based Learning

Problem-Based Learning (PBL) is an educational approach that focuses learning through the active solution of real-world problems. It involves students working collaboratively in groups to determine the knowledge and skills needed to address a specific problem, thereby enhancing their critical thinking, problem-solving abilities, and self-directed learning skills. PBL scenarios are typically based on real-life situations, providing meaningful and relevant learning contexts.

The characteristics of PBL are a) the use of engaging tasks or authentic problems as a starting point for learning; b) self-directed learning: Students take responsibility for their learning, determining what they need to learn and seeking out resources independently; c) student-centered approach: Students take an active role in their learning process, often working collaboratively to explore and resolve issues; d) facilitative teaching role: Instructors serve as facilitators rather than traditional lecturers, guiding students' inquiry and supporting their learning process (De Andrade Gomes et al., 2024).

The success of PBL relies on its ability to foster self-directed learning habits, enhance problem-solving skills, and deepen disciplinary knowledge. In a typical PBL setting, learning is triggered by a problem that needs to be solved. PBL provides an instructional framework that supports active and group learning—based on the belief that effective learning occurs when students both construct *and* co-construct ideas through social interactions and self-directed learning. In an iterative process, students first engage in a problem analysis phase, then a period of self-directed learning phase and finally a reporting phase. A facilitator acts as a guide to scaffold students' learning, particularly in the problem analysis and reporting components of the PBL tutorial (Yew & Goh, 2016).

Read more:

- Problem-Based Learning - Education - Maastricht University

- https://gsbs.uth.edu/files/faculty/Nilson%20Leading%20Effective%20Discussions.pdf
- https://www.youtube.com/watch?v=xLqnxIR2Fj4
- https://teaching.cornell.edu/teaching-resources/engaging-students/problem-based-learning#:~:text=Problem%2Dbased%20learning%20(PBL),the%20motivation%20and%20the%20learning

4.2.4 Learning by Developing

Learning by Developing is an educational approach that integrates learning with real-world projects. This method aims to enhance student engagement, foster deep understanding, and develop practical skills. This method emphasizes collaboration, practical application, and the development of both subject-specific skills and broader competencies, such as problem-solving and teamwork (Raij, 2013; Tynjälä, 2008). Learning by Developing is built on five core principles: real-world relevance, collaboration, reflective practice, innovation and creativity, and sustainability. Projects are derived from actual industry or community needs, ensuring that students engage in meaningful and relevant work. Students, teachers, and external partners collaborate closely, creating a dynamic learning environment. Continuous reflection helps students integrate theory with practice and develop critical thinking skills. Students are encouraged to think creatively and innovatively to solve real-world problems. Projects are designed with long-term impact in mind, promoting sustainable solutions and practices (Raij, 2013; Tynjälä, 2008).

To effectively implement Learning by Developing, educators should focus on project selection, team formation, mentorship and support, reflection and assessment, and showcase and feedback. Choosing projects connected to students' fields of study with tangible outcomes, in collaboration with industry/external partners, is crucial (Raij, 2013; Tynjälä, 2008). The Learning by Developing approach offers several benefits: enhanced engagement, skill development, industry readiness, and lifelong learning. Students are more motivated and engaged when working on projects with real-world implications. The emphasis on reflective practice fosters a mindset of continuous learning and improvement (Raij, 2013; Tynjälä, 2008).

While Learning by Developing is beneficial, it also presents challenges such as being resource-intensive, assessment complexity, and student preparedness. It requires significant resources in terms of time, mentorship, and industry partnerships. Evaluating student performance can be challenging due to the diversity of projects and outcomes. Not all students may be ready for the self-directed nature of Learning by Developing; initial training and support are crucial (Raij, 2013; Tynjälä, 2008).

Read more:

- https://www.theseus.fi/bitstream/handle/10024/159833/Laurea%20julkaisut%20101.pdf#page=9

4.2.5 Community-based Learning / Service Learning

Community-Based Learning (CBL) is an educational approach that combines community service with academic coursework, enhancing students' civic engagement and social responsibility. This approach offers a context for developing both academic and practical skills and is also known as service learning (Eyler & Giles, 1999; Bringle & Hatcher, 1996). Despite the diversity of definitions and theories related to CBL, some common characteristiscs exists (Flecky, 2011). Projects are designed to address real and pressing issues within the community. These projects engage students in research processes that

address community issues. Students take the lead in planning and executing projects, with support from educators and community partners. Projects typically span weeks or months, allowing for deep interaction with community stakeholders (Flecky, 2011).

A strong partnership between educational institutions and community organizations is essential to the development of CBL programs (Eyler & Giles, 1999). Therefore, it is important to engage community stakeholders in the development process, seeking their input and expertise to ensure that the learning experiences are aligned with community goals and values. Evaluation and assessment play a dynamic role in the implementation of CBL. By integrating assessment methods that evaluate both student learning outcomes and community impact, program developers can increase the effectiveness and sustainability of CBL. This process creates a feedback loop that facilitates continuous improvement and refinement in the educational experiences provided (Bringle & Hatcher, 1996).

Read more:

- https://www.mightynetworks.com/resources/community-based-learning
- https://digitalservicelearning.eu/digital-service-learning-toolkit/

4.3 Co-Creation methods

Co-creation methods are collaborative approaches used by organizations to involve various stakeholders in the creation and development of products, services, or experiences. These methods aim to harness the collective creativity, knowledge, and expertise of participants to achieve better outcomes.

4.3.1 Carpe Diem Process

The Carpe Diem process in education is a dynamic and engaging approach that emphasizes active student participation, collaboration, and practical application of knowledge. Derived from the Latin phrase "seize the day," this method transforms classrooms into interactive spaces where students are active learners rather than passive recipients (Salmon, 2013). A key element of the Carpe Diem process is the active engagement of students, who take an active role in their learning through interactive activities such as group discussions, hands-on projects, and problem-solving exercises. Educators act as facilitators, guiding students and encouraging critical thinking and inquiry (Garrison & Vaughan, 2008).

Moreover, the approach values peer learning, with students working together, sharing ideas, and learning from each other. Educators create opportunities for group work and peer interaction to build a sense of community and enhance social skills (Boud, Cohen, & Sampson, 2014). Learning is contextualized with real-world examples, case studies, and scenarios, making it relevant and meaningful. Educators design lessons that bridge the gap between theory and practice, preparing students for real-world challenges (Kolb, 2014).

Continuous feedback and reflection are integral, helping students understand their progress and develop a growth mindset. Educators facilitate reflective practice by providing constructive feedback and encouraging self-assessment (Schon, 1987). The process leverages digital tools and online platforms to enhance learning experiences. Blended learning models combine face-to-face instruction with online activities for greater flexibility and accessibility (Graham, 2006).

By incorporating these elements, the Carpe Diem process empowers students, enhances their understanding and skills, and prepares them for future challenges. For educators, it represents an opportunity to create a vibrant and effective learning environment by seizing the day and transforming educational experiences.

Read more:

- http://www.gillysalmon.com/uploads/1/6/0/5/16055858/carpe_diem_planning_process_workbook_v17-january_2015.pdf

4.3.2 ABC learning design

ABC Learning Design is a contemporary pedagogical approach that emphasizes Activity, Background, and Collaboration as core components of the learning process. Developed by Young and Perović in 2016, this method aims to create a structured yet flexible framework that enhances student engagement, facilitates deeper understanding, and fosters collaborative learning environments. ABC Learning Design is particularly effective in higher education settings where the integration of technology and active learning strategies is crucial.

At the heart of ABC Learning Design is the focus on activity-based learning. This component emphasizes the importance of engaging students through hands-on, practical activities that promote active participation and experiential learning. Activities are designed to be interactive and dynamic, encouraging students to apply theoretical knowledge in practical scenarios. By incorporating activities such as problem-solving tasks, case studies, and simulations, educators can create a more stimulating and effective learning environment (Prince, 2004).

The Background component of ABC Learning Design focuses on providing students with the necessary context and foundational knowledge required to engage in higher-level thinking and complex problem-solving. This involves a combination of pre-class readings, multimedia resources, and introductory lectures that set the stage for more in-depth exploration during class activities. According to Bransford et al. (2000) providing a solid background helps students build a robust cognitive framework, enabling them to better understand and integrate new information. This preparatory phase ensures that students come to class ready to participate actively and meaningfully in the learning process.

Collaboration is the third pillar of ABC Learning Design, emphasizing the role of social learning and teamwork in education. Collaborative activities are designed to encourage peer-to-peer interaction, communication, and group problem-solving. By incorporating group projects, peer reviews, and collaborative discussions, educators can create a learning environment that mirrors real-world professional settings, where teamwork and communication are essential skills.

The benefits of ABC Learning Design are manifold. By integrating activity-based learning, students are more engaged and motivated, leading to improved retention and comprehension of material. The emphasis on providing a strong background ensures that students have the necessary context to engage in higher-order thinking and problem-solving. Moreover, the focus on collaboration helps students develop essential soft skills such as communication, teamwork, and critical thinking, which are highly valued in the modern workforce.

ABC Learning Design also presents challenges. One of the primary obstacles is the need for significant preparation and planning on the part of educators. Designing effective activities and ensuring that background materials are comprehensive and accessible can be time-consuming. Additionally, managing collaborative activities in a classroom setting requires skill and experience to ensure that all students participate actively and that group dynamics are positive and productive.

ABC Learning Design represents a forward-thinking approach to education that aligns with contemporary understanding of effective teaching and learning practices. By emphasizing activity, background, and collaboration, this method creates a rich, interactive learning environment that prepares students for the complexities of the modern world. As educational paradigms continue to evolve, methods like ABC Learning Design will play a crucial role in shaping the future of teaching and learning, ensuring that students are not only knowledgeable but also skilled and adaptable.

Read more:

- https://abc-ld.org/

5 Assessments

Formative and summative assessments are two key components of educational evaluation, each serving distinct purposes in the learning process. The key differences are a) in the purpose: Formative assessments aim to improve learning during the process, while summative assessments aim to evaluate the learning at its conclusion; b) in the timing: Formative assessments are conducted throughout the instructional period, whereas summative assessments are administered at the end; and c) in the kind of feedback: Formative assessments provide immediate feedback to both students and instructors, while summative assessments provide a final evaluation of student learning. Both formative and summative assessments are essential in education, serving complementary roles in enhancing and measuring student learning (Ismail et al, 2022; Desimone, 2009).

5.1 Formative Assessments

Formative assessments are informal and ongoing processes used by educators to monitor student learning and provide feedback that can be used to improve both teaching and learning. These assessments are often low-stakes and can take various forms, such as quizzes, in-class activities, discussions, or homework assignments. The primary goal of formative assessment is to identify areas where students are struggling and to address these gaps in understanding promptly. Regularly collecting student feedback through surveys, questionnaires, or informal discussions provides direct insight into students' perceptions of teaching methods and their effectiveness (Díaz et al., 2010). Formative assessment helps in adjusting instructional strategies to better meet students' needs and supports students in developing a deeper understanding of the subject matter.

Examples of formative assessments for students:

1. **Quizzes**: Short, frequent quizzes that check students' understanding of recent material without significantly impacting their final grades.
2. **In-Class Activities**: Group discussions, peer reviews, or interactive exercises that help students engage with the content and assess their understanding.
3. **Homework Assignments**: Tasks given to students to complete outside of class, providing practice and feedback opportunities.
4. **Reflective Journals**: keeping a daily or weekly journal to reflect on teaching experiences, helping in identifying areas for improvement and tracking progress over time (Farrell, 2013).
5. **Think-Pair-Share**: Students think individually about a question, then discuss their thoughts with a partner before sharing with the larger group, allowing for the assessment of understanding at different stages.
6. **Peer observations:** where colleagues observe classes and provide constructive feedback, offer an external perspective and can highlight strengths and areas for growth that may not have been noticed (Hendry & Oliver, 2012).
7. **Self-evaluation checklists** to evaluate various aspects of teaching, such as lesson planning, delivery, and classroom management, provides a structured approach to self-assessment and ensures comprehensive coverage of all teaching aspects (Brown & Knight, 1994).

Teachers makes observations and note student behaviors, participation, and responses during class activities. Analysing student performance data, such as grades, test scores, and assignment completion rates, helps in assessing the effectiveness of teaching methods and understanding their impact on

student learning (Guskey, 2002). By regularly engaging in self-assessment, educators can continuously refine their teaching practices, leading to improved student outcomes (Boud, 1995).

5.2 Summative Assessments

Summative assessments are used to evaluate student learning at the end of an instructional period, typically for the purpose of assigning grades. These assessments are usually high-stakes and can include final exams, standardized tests, term papers, or final projects. Summative assessments aim to measure the extent of student learning, knowledge, and skill acquisition against predefined standards or benchmarks. They provide a summary of what students have learned and are often used for accountability purposes, such as determining whether students have achieved the learning outcomes of a course or program (Ismail et al, 2022).

Examples of Summative Assessments:

1. **Final Exams**: Comprehensive tests administered at the end of a course, covering all major content areas.
2. **Standardized Tests**: Exams such as state assessments or standardized national tests used to evaluate overall student learning and compare performance across different populations.
3. **Final Projects or Portfolios**: Cumulative projects or collections of student work that demonstrate learning and skills acquired over a course or semester.
4. **Term Papers**: In-depth essays or research papers that require students to synthesize and apply knowledge from the course.
5. **Presentations**: Oral or multimedia presentations summarizing key learnings from the course, often involving both a written component and a live or recorded presentation.
6. **Performance Tasks**: Practical assessments, such as laboratory experiments or role-plays, where students apply their knowledge and skills in real-world scenarios.

These assessments help gauge both ongoing progress and final mastery of course content, providing a balanced approach to evaluating educational outcomes (Ismail et al, 2022).

6 Good pedagogical practices

The aim is to provide teachers with strategies and methods to teach the principles and applications of Digital Rehabilitation to students and healthcare professionals. By offering practical, real-world examples, this chapter aims to provide an idea of Digital Rehabilitation education and ultimately contribute to better healthcare delivery in the region.

These examples are tailored to the unique educational and healthcare landscapes of East African countries, providing relevant and adaptable solutions that address local challenges and opportunities. This chapter aims not only to inform, but also to inspire and empower teachers to provide training that prepares healthcare professionals to use Digital Rehabilitation technologies in their practice.

The examples are either a learning activity or an entire course design and include information about the teaching approach, the learning plan and ideas for assessments.

6.1 Good practice example 1

Designing a community based Digital Rehabilitation program to improve access and affordability of rehabilitation services: A learning activity for undergraduate physiotherapy learners - an example from Kenya.

Context:

- The activity described below is embedded in the course "Community based Rehabilitation" (CBR) and is conducted in the third year of the bachelor of physiotherapy program at MOI University in Kenya. The course is worth a total of six credits. The course lasts six weeks.
- The competences that are targeted in the course are the following:
    - Clinical and technical skills in CBR
    - Digital literacy and technology proficiency
    - Community engagement and advocacy
    - Interdisciplinary collaboration

Aim of the learning activity:

- Develop a digital community-based rehabilitation program to improve accessibility and affordability of rehabilitation services.

Learning outcome for the learning activity:

- The learner will demonstrate the ability to design and develop a Digital Rehabilitation program that effectively enhances the accessibility and affordability of rehabilitation services in the community. This includes the application of relevant technological solutions, understanding user needs, and evaluating the programs impact on diverse populations in Kenya.

Detailed breakdown of the learning outcome

Technical proficiency:

- The learner will be able to utilize appropriate digital tools and technologies to create a functional rehabilitation program.

- The learner will demonstrate skills in integration of digital health solutions.

Project management:

- The learner will plan the implementation of the Digital Rehabilitation program, including project management, resource allocation, and timeline management.
- The learner will demonstrate the ability to collaborate with stakeholders, such as healthcare professionals and clients.

Evaluation and improvement:

- The learner will collect and analyze data to evaluate the program impact on accessibility, affordability, and patient outcomes.

Ethical and social considerations:

- The learner will understand and address ethical issues related to digital health interventions, such as client privacy, data security, and equitable access.
- The learner will demonstrate awareness of social determinants of health and strive to reduce health disparities through their program.

Learning prerequisites:

- Knowledge to assess rehabilitation needs.
- Knowledge of different rehabilitation concepts, including Digital Rehabilitation and community-based rehabilitation and their benefits and challenges.
- Ability to measure the factors for successful rehabilitation services and the impact on all stakeholders.
- Knowledge of digital tools and technologies that can be used for different rehabilitation purposes (including supporting accessibility and affordability).

Teaching method

Community engagement and service learning:

- Collaborating with local healthcare facilities, NGOs, and community organizations to provide learners with opportunities to interact with real users and stakeholders.
- Learners can gather insights, validate their solutions, and understand the local context better.
- See for the community-based and service-learning method section 4.2.5.

Project-based learning (PBL):

- Learners engage in a real-world project that involve developing a Digital Rehabilitation program.
- Learners can work in teams to address specific challenges related to accessibility, affordability, and effectiveness in Kenyan healthcare settings.
- For more information about the project-based learning method see Almulla (2020): https://journals.sagepub.com/doi/full/10.1177/2158244020938702

- **Learning plan:**

Week 1:

- **Online software demos:** Arrange demos of Digital Rehabilitation tools and software platforms, allowing learners to explore features and functionalities relevant to improving accessibility, and affordability of rehabilitation services.

- Below are some examples of digital tools that can be introduced at this stage. The following examples show technologies that can be used in the community. Technologies should be used in the community that facilitate access to rehabilitation and can be used with limited resources. The use of technologies often depends on the availability of the internet or hardware (tablets, smartphones). This is why low-tech solutions such as apps or text-messaging tools are often used in resource restraint areas. More digital technologies, the advantages of those technologies for this context, and the resources required to use the individual solutions can be found in the handbook "Digital Rehabilitation in Health Care for East African countries" in chapter 6: https://www.jamk.fi/en/project/radic/radic-handbook-6-technologies .

- **Mobile Apps**:
- **Tools**: Physitrack, Kaia Health, etc.
- **Purpose**: To provide learners with insights into remote app-based rehabilitation programs for chronic pain, musculoskeletal pain, and mental health. Students can explore app features like exercise programs, progress tracking, and client education. Mobile applications are highly effective for rehabilitation in underserved areas like East Africa due to their widespread accessibility, cost-effectiveness, and ability to provide remote monitoring, personalized care, and educational content. These apps leverage mobile technology to deliver scalable and culturally adaptable healthcare services, improving health outcomes and empowering patients.

  - **Text messaging:**
  - **Tools:** SMS, WhatsApp, etc.
  - **Purpose:** To provide the learners the insights that text messaging can be used as a therapy reminder to improve therapy adherence, as a motivator to promote physical activity, as a digital supported intervention, and as client education on the knowledge of diseases. Text- messaging technologies are powerful tools in rural areas, because it does not require always an internet connection. In addition, participants text-messaging is less dependent on literacy and therefore accessible and usable by more people.

- **Videoconferencing:**
- **Tools:** Zoom, Microsoft Teams, etc.
- **Purpose**: To demonstrate remote client monitoring and virtual consultations, showcasing how telehealth can improve access to rehabilitation services, especially in underserved areas.

Week 2:

- **Virtual field trip:** Take a virtual tour of successful community-based rehabilitation programs around the world, allowing learners to interact with program coordinators and beneficiaries.

Week 3:

- **Case-based learning:** Present real-life case studies of individuals with disabilities and ask learners to discuss and propose appropriate rehabilitative interventions.

Week 4:

- **Online software demos:** Arrange demos of Digital Rehabilitation tools and software platforms, allowing learners to explore features and functionalities relevant to improving accessibility, affordability, and effectiveness of rehabilitation services.
- Continuation and consolidation of week 1 or introduction of new technologies. In a deepening, the learners should not only try out the technologies, but also try to use them in a community-based rehabilitation situation.

Week 5:

- **Group project:** Task learner groups with developing a proposal for a Digital Rehabilitation program, including considerations for accessibility and affordability, and present their proposals to the class.

Week 6:

- **Virtual community engagement:** Organize virtual meetings or interviews with stakeholders from communities to discuss their experiences and challenges related to access rehabilitation services.
- **Case study analysis:** Present case studies of successful community-based rehabilitation projects and facilitate discussions on the strategies and approaches used to overcome challenges and improve access to services (Comprehensive Community Based Rehabilitation Tanzania (CCBRT)).

Assessment:

For this course, formative assessments are appropriate to evaluate the skills and knowledge for the following reasons:

Continuous Feedback: Formative assessments provide ongoing feedback, allowing students to continually refine their understanding and skills as they develop their Digital Rehabilitation programs.

Real-Time Adaptation: These assessments help instructors identify areas where students are struggling and adjust their teaching methods or provide additional resources promptly, ensuring that learning objectives are met throughout the course.

Skill Development: Formative assessments emphasize the development of practical skills and critical thinking necessary for designing effective rehabilitation programs, rather than solely focusing on theoretical knowledge.

Contextual Learning: In a course with a specific regional focus, such as Kenya, formative assessments can be tailored to the local context, allowing students to address real-world challenges and apply their learning in meaningful ways.

Collaborative Learning: These assessments can facilitate peer collaboration and discussions, fostering a community of practice among students that mirrors the collaborative nature of community-based rehabilitation programs.

Iterative Improvement: Formative assessments encourage an iterative learning process, where students can test, receive feedback, and improve their Digital Rehabilitation designs, leading to more robust and effective final projects.

To assess the skills in this module you can use the following formative assessments:

- Case study analysis
- Case study application
- Case study reflection
- Project proposal

6.2 Good practice example 2

An introduction to “Digital Health” in undergraduate studies – a course example from Rwanda

Context:

- The course “Digital Health” is included in the bachelor of “Medicine”. The course contains of 5 credit points and takes place at the “University of Global Health Equity” in Rwanda.
- Digital Health is a comprehensive term that encompasses the utilization of digital technologies for patient communication and the evaluation of physical conditions and diseases. It stems from the broader concept of electronic health (eHealth), which acknowledges the application of information and communications technology to address healthcare needs and support health systems.
- The competences that are targeted in the course are:
    - Proficiency with digital health tools
    - Health informatics skills
    - Ethical and legal competencies
    - Analytical and problem-solving competencies
    - Communication competencies

Learning outcome of the course Digital Health:

- Describe the key components of the Digital Health
- Describe technologies and their application in Digital Rehabilitation
- Understand how to create/deliver/evaluate digital health technology solution
- Understand the concepts of data privacy
- Implement Digital Rehabilitation technologies

Learning prerequisites:

- Basic knowledge of rehabilitation practices
- Understanding of traditional rehabilitation practices.
- Familiarity with current digital technologies used in healthcare, such as electronic health records (EHRs), telemedicine, wearable devices, and mobile health apps.
- Ability to conduct thorough assessments to identify client needs, capabilities, and limitations, which are critical for tailoring rehabilitation efforts.
- Effective communication is crucial for working with interprofessional teams and for solving problems that arise during Digital Rehabilitation processes.

- Ability to analyze situations, identify problems, and devise effective solutions, especially when integrating new technologies into traditional practices.

Learning plan:

Week 0:

- Pre-Course readings: Canvas LMS orientation

Week 1 -2:

- Introduction to Digital Health. Here are the main components that could be included:

Definition and scope of Digital Health

  - **What is Digital Health?**: Overview of digital health, including its definition and various subfields such as telemedicine, mobile health (mHealth), health informatics, and wearable technologies.
  - **Scope and Importance**: Explanation of the scope of digital health, its significance in modern healthcare, and its potential to transform healthcare delivery and outcomes.

Technological foundations

  - **Data management**: Introduction to data collection, storage, and management in digital health, including the importance of data security and privacy.

Applications of Digital Health

  - **Telemedicine**: Use of telecommunications technology to provide clinical health care at a distance.
  - **Mobile Health (mHealth)**: Health practices supported by mobile devices such as smartphones and tablets.
  - **Wearable devices**: Technologies that monitor and record data related to personal health and fitness.
  - **Health informatics**: Integration of healthcare sciences, computer science, information science, and cognitive science to assist in the management of healthcare information.

Benefits of Digital Health

  - **Improving access**: How digital health technologies enhance access to healthcare services, especially in remote and underserved areas.
  - **Cost-effectiveness**: Discussion on how digital health can reduce healthcare costs for both providers and patients.
  - **Quality of care**: How digital health can improve the quality of care through better diagnostics, personalized treatment plans, and continuous monitoring.

Challenges and barriers

  - **Technological challenges**: Issues related to the integration and interoperability of digital health systems.
  - **Regulatory and ethical issues**: Legal and ethical considerations in the implementation of digital health technologies, including data privacy, security, and regulatory compliance.

- **Adoption barriers**: Barriers to the adoption of digital health technologies by healthcare providers and patients, such as resistance to change, lack of digital literacy, and infrastructure limitations.

Week 3 - 4:

- Digital determinants of health and data system management. The content focuses on understanding how digital tools and systems influence health outcomes and the effective management of health data. Here are the main components that could be included:

Introduction to digital determinants of health

- **Definition and scope**: Explanation of digital determinants of health, which are factors related to digital technologies and systems that impact health outcomes.
- **Components**: Overview of various digital determinants including access to technology, digital literacy, and online health information.

Role of digital technologies in health determinants

- **Health literacy**: The role of digital platforms in improving or hindering health literacy and education.
- **Social determinants**: Interaction between digital health technologies and broader social determinants of health such as socioeconomic status, education, and geographic location.

Data collection and management

- **Data collection methods**: Techniques and tools for collecting health data (e.g., surveys, sensors, patient portals).
- **Data quality and accuracy**: Ensuring data integrity, accuracy, and reliability in digital health systems.
- **Data storage and security**: Best practices for storing health data securely and ensuring patient privacy.

Data analysis and utilization

- **Decision support systems**: Use of data to support clinical and administrative decision-making processes.

Impact of digital determinants on health equity

- **Equity and access**: Exploring how digital health tools can either bridge or widen health disparities.
- **Strategies for equity**: Approaches to ensuring equitable access to digital health resources for underserved populations.

Week 5 - 6:

Implementation and evaluation of Digital Health technologies solutions. The module should provide a thorough overview of the processes involved in deploying and assessing digital health technologies:

Implementation strategies for Digital Health technologies

- **Planning and preparation**:
  - **Needs assessment**: Creating a plan how to identify and analyze the needs of the target population.
  - **Stakeholder engagement**: Plan how to involve stakeholders, including healthcare providers, patients, and policy makers, in the planning process.

- **Technology selection**:
  - **Criteria for selection**: Factors to consider when selecting digital health technologies (e.g., usability, integration with existing systems).

- **Deployment**:
  - **Pilot testing**: Conducting pilot studies to test the technology in a controlled setting before full-scale deployment.
  - **Scaling up**: Strategies for expanding the technology to broader populations once the pilot phase is successful.

Evaluation of Digital Health technologies

- **Evaluation frameworks**:
  - **Models and frameworks**: Overview of common models and frameworks for evaluating digital health technologies (e.g., Kirkpatrick Model, RE-AIM framework).

- **Outcome measures**:
  - **Effectiveness**: Assessing the impact of the technology on health outcomes, such as improved patient care or reduced costs.
  - **User satisfaction**: Measuring user satisfaction and experience with the technology.
  - **Cost-effectiveness**: Evaluating the cost versus benefits of the technology to determine its economic impact.

- **Data collection methods**:
  - **Quantitative methods**: Use of surveys, tests, and metrics to gather numerical data on technology performance.
  - **Qualitative methods**: Interviews, focus groups, and observations to gain insights into user experiences and challenges.

- **Performance metrics**:
  - **Key performance indicators (KPIs)**: Identifying and tracking KPIs relevant to the technology's goals (e.g., adoption rates, engagement levels).

Learning activity after week 6 and assessment:

- Mapping of rehabilitation needs in the community:
  - **Proposal:** Clarity, scope, and feasibility of the project.
  - **Literature Review:** Depth of research and understanding of existing methodologies.

- **Survey design:** Relevance and clarity of survey questions.
- **Data analysis:** Accuracy and insightfulness of the preliminary analysis.
- **Final report:** Comprehensive coverage of all components, clarity, and coherence.
- **Presentation:** Effectiveness in communicating findings, engagement with the audience, and use of visuals.
- This assignment provides a holistic approach to understanding and mapping rehabilitation needs, incorporating research, data collection, and, analysis. It prepares students for real-world public health planning and interventions.
- **Individual contribution**: Each group will need to create a web page presentation mapping data including the Digital Rehabilitation needs of specific people (Sex, Age, MET+UNMET) from any community.

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