
ESTUDIOS / RESEARCH STUDIES

Health Professionals' Competencies in the Framework of Complexity: Digital Training Model for Education 4.0

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Abstract: Complex environments require changes in training models for health professionals to support access to knowledge for teaching and clinical research decision-making. These changes require digital competency training to successfully address knowledge acquisition and lifelong learning in the digital health ecosystem. This research aims to analyse the habits of use of information resources by healthcare professionals in professional practices and to propose a model for training in digital competence. An exploratory and explanatory research method was chosen. Data collection techniques included pre-test and post-test questionnaires for the training activities. The program designed to develop digital competency under the model proposed in this study had significant acceptance among users who valued all the contents, resources, and teachers and considered it effective. Training in digital competencies is one of the drivers of digital transformation. Teaching-learning models in virtual environments pose challenges for 21st-century libraries.

Keywords: information skills training, information literacy, digital competencies, health library.

Competencias de los Profesionales Sanitarios en el Marco de la Complejidad: Modelo de Formación Digital para la Educación 4.0

Resumen: En entornos complejos, los profesionales sanitarios necesitan adaptar sus modelos de formación para acceder al conocimiento y tomar decisiones en la docencia y la investigación clínica. Esto implica desarrollar competencias digitales para aprovechar el ecosistema sanitario digital y mantener un aprendizaje continuo. Con el objetivo de analizar los hábitos de uso de los recursos de información por parte de los sanitarios y proponer un modelo de formación en competencia digital, se llevó a cabo una investigación exploratoria y explicativa. Los datos se recopilaban mediante cuestionarios en actividades formativas. El programa diseñado para desarrollar estas competencias digitales fue bien recibido por los usuarios, quienes valoraron positivamente los contenidos, recursos y docentes, considerándolo efectivo. La formación en competencias digitales es crucial para la transformación digital en el campo de la salud. Los entornos virtuales de enseñanza-aprendizaje también plantean desafíos para las bibliotecas en el siglo XXI.

Palabras clave: formación en habilidades informacionales, alfabetización informacional, competencias digitales.

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1. INTRODUCTION

Environments with multiple interactions bring unforeseen events where prevention for the unexpected is required. The transformation of the collections support to a digital format meant a change in the modes and characteristics of access to information, especially when considering the complexity of systems made up of parts coordinated for their functions and articulations of the whole (Morin, 2020). The articulation between the complexity paradigm and the medication system allows us to foresee opportunities to improve the quality of safe care (De Medeiros & Santos, 2019) and interdisciplinary interactions to support the prevention of the unexpected in complex environments (Baena-Rojas, et al., 2022). Despite the progress in the last decade, challenges to integrating these different worlds include creating and implementing management tools capable of dealing with this process's complexity (Zarpelon et al., 2018). The present research refers to the practices of health professionals using the information resources they handle to search for information related to professional competencies and investigate the digital competencies they possess in the digital information ecosystem.

Digital transformation has become imperative in all processes, services, and institutions. One of the concerns affecting societies worldwide has been the cycle of change that led to the transition from the digital society to the knowledge and learning society (Castells, 2001). The health crisis and the social distancing imposed by the COVID-19 pandemic have highlighted the urgent need for specialists to address professional tasks in the digital information ecosystem (EBLIDA, 2020). Therefore, training in digital skills is now critical. Teleworking, communication through digital channels, and technology-mediated interaction require these competencies. In the future of education, developing complex thinking, digital literacy, new learning spaces, and education must be emphasized (Ramírez-Montoya, 2022). Environments where context awareness, citizen participation, use of infrastructure, technological innovation, educational innovation, scope and scale, networking, and complex thinking must be established (Sanabria-Z et al., 2022). The same competencies are used for interaction with patients, caregivers, colleagues, or citizens through different communication channels. These are just a few examples of the reality faced by healthcare workers during confinement for which they were not sufficiently trained.

Digital skills have been considered key to societal digital transformation. During the COVID-19

pandemic, educational reforms have been accelerated to regulate digital transformation and competency-based training (European Commission, 2022). Several organizations have become involved in digital transformation by adopting various educational strategies (OECD, 2022; UNESCO, 2019). The European health committee has recommended a more significant emphasis on training health professionals for the future of care and transformation towards digital health in clinically directed practices, teaching, and research (Bryant et al., 2015). The continuing education of health professionals faces significant challenges in the knowledge society and e-Health. The library with an online presence should reinvent itself for the new digital environment, enhancing online services on essential digital competencies for professionals' continuing learning (Laurillard et al., 2016). In this complex field, how can we continue to develop digital competencies in healthcare professionals?

In this study, we wanted to analyze the practices that health professionals carry out when they need to obtain information for their professional and research activities in a healthcare area and to assess the degree of knowledge, they have of the digital information ecosystem. This would allow us to generate a training innovation model for health professionals in the framework of complexity. The research question was: What are the practices that health professionals carry out when they need to obtain information for their professional and research activities? This paper presents a conceptual framework of digital competencies for health professionals, the method with applied instruments, and the results with quantitative and qualitative data. It closes with a discussion and conclusions of the study.

2. LITERATURE REVIEW AND STATE OF THE ART

Acquiring digital competencies is fundamental to the teaching-learning process throughout life because it becomes evidence of the knowledge, skills, and proficiency linked to practice in various educational, clinical, and research settings. It requires a deep understanding of the complexity of participants' needs in learning processes, identifying how to respond, and addressing flexibility, self-efficacy, and ownership; care and enthusiasm of facilitators; and the development of competencies in new digital environments (Hews et al., 2022). (Tveiterås & Madsen, 2022) state that from 2014 to 2017, there was an increased awareness of the professional complexity of digital competency in education. Also, the integrated development of different digital educational resources, considering

competency and resource-oriented approaches, enhances the digital competency process (Soloshych et al., 2021). In complex environments, developing digital skills can support bringing new actions.

Digital competency is one of the critical competencies that healthcare professionals must possess to participate as active citizens in society and continue learning throughout life. There are various definitions of competencies; UNESCO's reports, establish that competencies respond to the challenges of the current societal environment in daily and professional life (Roegiers, 2016). A similar perspective is found in the Organization for Economic Co-operation and Development (OECD) definition, which focuses on the need for students to gain competencies that they retain and use throughout their lives (OECD, 2012). Within the Sustainable Development Goals 2030, UNESCO pointed out the importance of training in Digital Competency and published a global reference framework to assess this competency. The Chartered Institute of Library and Information Professionals (CILIP) highlights the relevance of these competencies for all people, not only those belonging to the educational field (Coonan et al., 2020). To prepare for these competencies, the Association of College and Research Libraries (ACRL) published the document "Framework for Information Literacy for Higher Education" (Iannuzzi, 2000) and, in 2013, published a specific framework for training aimed at nurses (American Library Association, 2013). In this respect, health professionals have been the subject of study to develop digital skills, mainly information literacy.

Information literacy (IL) has undergone a process of evolution and interrelation with other literacies such as computer and media literacy. Today IL is integrated with digital competencies that encompass multiples literacies. CILIP synthesizes in the present consensus the Definition of Information Literacy 2018 (Sales, 2020) as the ability to think critically and make balanced judgments about any information, empowering citizens to attain and express knowledgeable opinions and fully engage with society. This definition is validated in developing the European Digital Competency Framework (DigCom) (Ferrari, 2013), which is recognized as the knowledge, attitudes, and skills needed to actively participate in the digital environment. The European framework includes five competency areas necessary to acquire the knowledge, skills, and attitudes to use information in digital media to perform tasks and solve problems: create and share content critically, ethically, reflectively, and autonomously for work, leisure, participation, and learning; manage the digital identity safely; and make creative and independent use of the devices

and utilities available in the digital ecosystem (González-Fernández-Villavicencio, 2015). Within this framework, the involvement of information professionals is critical in designing training programs for all educational levels throughout life.

Developing digital competencies requires integrating infrastructure, models, methods, techniques, resources, and strategies. Health professionals recognize that they need training in these competencies and must apply them throughout their careers, considering that should be eminently practical with the learning-by-doing method, which would directly benefit the patient (Committee on Digital Skills for Health Professionals & European Health Parliament, 2016). Healthcare professionals perceive digital competencies as necessary to perform in healthcare practice (McGowan, 2019), research practice, and teaching practice (Ma, W. & Luo, Q, 2022). Libraries have designed training strategies to meet new training demands, incorporating modern technologies and innovative pedagogical methods (Ziegenfuss & LeMire, 2019). To train health professionals, new processes and models are required to support the development of their digital skills. New processes and models are needed to train healthcare professionals to support the development of their digital competencies.

Educational innovation requires incorporating technology to learn and teach digital competencies, Technology significantly contributes to educational innovations. Information and communication developments provide new possibilities for developing creative learning strategies (Gaspar Pinto & Ochôa, 2019). Several publications link the concepts of Digital Competency and Information Literacy, leading to theoretical discussions and a reference framework for instructional design. The review of information-related concepts (Sample, 2020) and related innovative pedagogy (Strelan et al., 2020) is critical for collaboration between teacher-trainers and librarians (Campal García, 2019). Digital competencies are one of the substantial competencies developed in Education 4.0 (Sarango et al., 2021) in environments where complexity is framed to integrate infrastructures, technologies, methods, and strategies that promote high capacities in people. (Miranda et al., 2021; -Montoya et al., 2021).

3. METHOD

Our approach involved a three-stage process. Firstly, we conducted an exploratory analysis of the impact of a Virtual Library model on research practices. In the second stage, we collected quantitative data to assess the digital competencies

of professionals. Finally, we developed a training program using a combination of face-to-face and virtual methods, incorporating 2.0 technologies. This training was initially delivered in a face-to-face setting and later adapted to a virtual format using virtual learning and collaborative tools during the pandemic.

The study population involved health professionals from the Eastern Health Management Area of Malaga-Axarquía (1,327 professionals). The questionnaire was answered by 298 professionals, of whom 150 participated in the face-to-face activities. The total population targeted for online training was 1,327. Convenience sampling was used. Thus, the sources of information were the health professionals in the Axarquía area: specialist physicians, nurses, teachers, and external collaborators. The data collection techniques were the literature review, the forms designed to collect information three times before the training (C1), the form used after the blended training (C2), and the form distributed during the pandemic (C3). We used the pre-test and post-test questionnaires and the satisfaction questionnaire for the training activities. (The questionnaires are available on request from the correspondence author).

Previous research publications conducted in the United States on the use and penetration of e-books have already reviewed and determined the validity and reliability of the instrument. This questionnaire was then adapted for research on the use of e-books in university libraries in Castilla and León, as well as the questionnaire of Gardner & Inger (2021) and Inger and Gardner (2016). In conducting this research, ethical

processes were followed to ensure the protection of personal data and the identity of the research participants, as outlined by the British Educational Research Association (BERA) guidelines (2019). The theoretical, methodological, and data analysis processes were also considered in the research.

4. RESULTS

Nurses and medical personnel are facing significant challenges in finding the information they need and accessing relevant information online, e-books, and technology. Many of them have reported feeling frustrated by the lack of easily accessible and comprehensive information sources, which can impede their ability to provide quality care to patients. Additionally, they have expressed concern about missing critical information due to the overwhelming volume of data available and the difficulty in identifying the most relevant and accurate sources. These issues can have a direct impact on patient outcomes and highlight the urgent need for improved digital competencies and more effective training programs for healthcare professionals.

When readers want to locate a specific document and already have the reference, the information retrieval systems differ from when they wish to consult journals. PubMed or other bibliographic databases are the most used sites for locating articles, journal websites, and then Google Scholar follows. (Figure 1)

A variety of devices are utilized for digital reading purposes, including both books and journals. Desktop computers and laptops are the most frequently used devices for consulting periodicals,

Figure 1. Sites used for on-line journals.

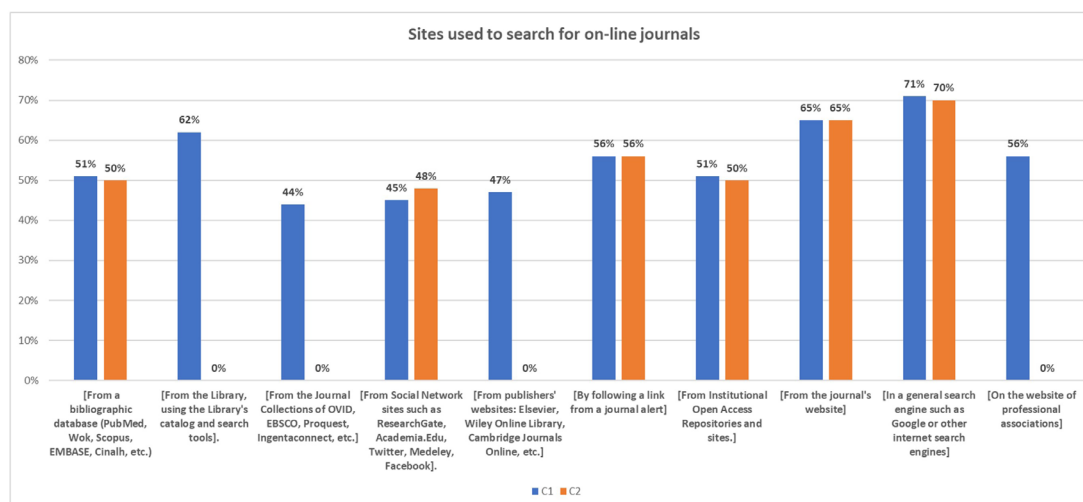
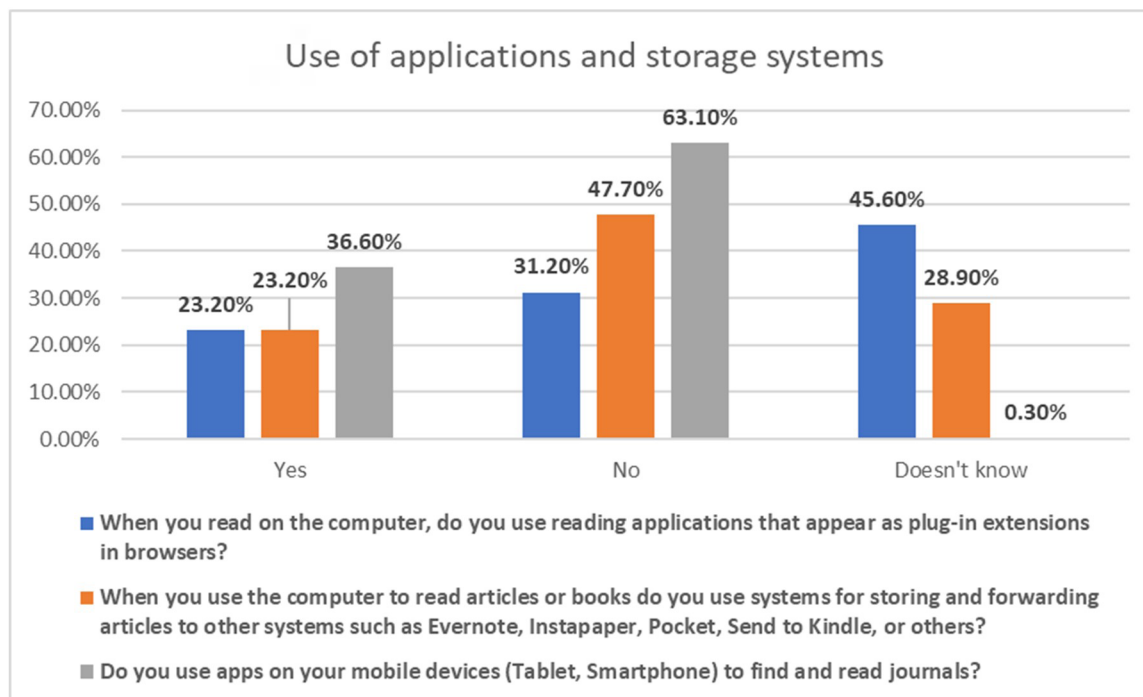


Figure 2. Use of applications and storage systems.

while e-readers, smartphones, and tablets are the preferred devices for accessing books.

In terms of utilizing applications and storage systems for digital information management, it presents an occasion to assess the proficiency of participants in employing bibliographic managers which are highly esteemed tools for such purpose. The outcomes of the distinct phases revealed that roughly thirty percent of respondents did not utilize these aids during the initial phase of the C1 consultation. Moreover, in the subsequent C2 survey, the employment of reading applications was observed in less than 30% of male participants and less than 20% of female participants. The usage of bibliographic managers exhibited a gradual rise from the initial survey to the subsequent one. The utilization of browser extensions, storage systems, and mobile applications in C1 was unknown or not used; only 36.6% used mobile applications for reading, and 23.2% used storage systems and computer plug-ins for information management. (Figure 2)

When it comes to utilizing books, readers need to have a grasp of the keys to the book ecosystem, especially since digital readers could interact with the vast sea of digital information and share it through screens. Professionals rely on a wide array of websites to access books. Throughout the study, general search engines such as Google were found

to be the most used sites for searching for books, followed by professional library databases and library tools. In addition to online searches, discovery tools also complement the process of selecting and finding documents on library webpages.

According to the findings, a significant proportion of health professionals, specifically 55.3%, rely on digital libraries and scholarly society websites for their information needs. Moreover, the majority of health professionals exhibit a good level of proficiency in navigating and utilizing various online platforms to search for books and other relevant sources effectively. This highlights the importance of digital literacy among health professionals in the modern age, where access to information is critical for providing quality care to patients.

The sources of information relied upon by health workers at all three points in time (C1, C2, and C3) were journals and books. The pandemic has brought about a shift in how people perceive different sources of information. Notably, trust in journals has experienced a surge, possibly due to the increased reliance on scientific research to guide decision-making during the crisis. Conversely, trust in Google Scholar appears to have decreased, possibly due to the proliferation of low-quality sources that have made it harder to filter out reliable information. Interestingly, trust in podcasts has gone up, possibly

Figure 3. Use of Information Sources (C1).

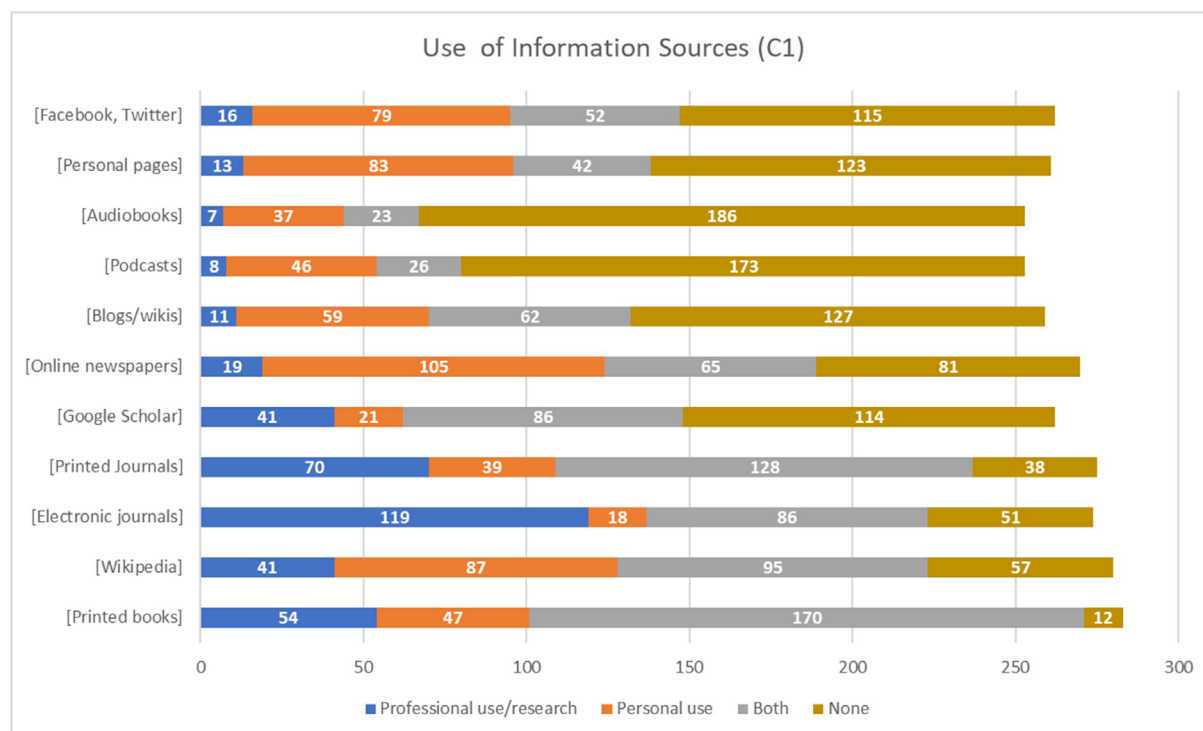
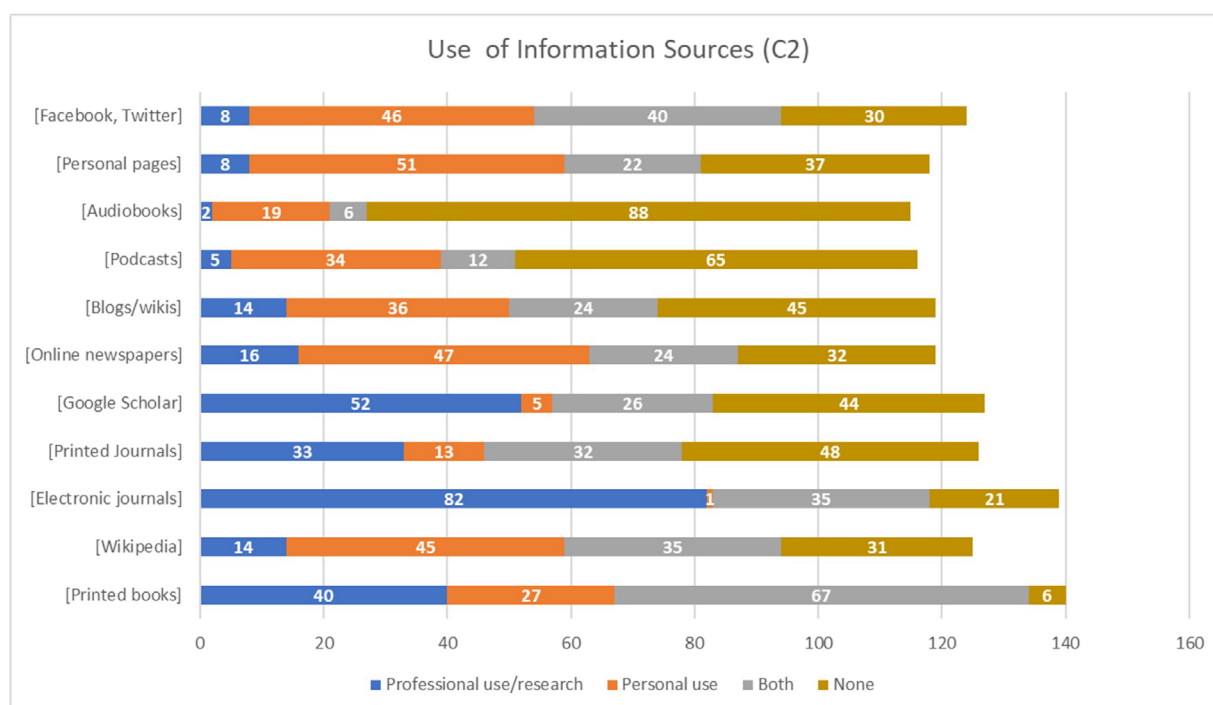


Figure 4. Use of information sources (C2)



due to their convenience and ability to provide in-depth analysis and expert opinions. On the other hand, social networks were rated as the least trustworthy source during the pandemic, likely due to the spread of misinformation and the difficulty in verifying the accuracy of sources. Finally, Wikipedia was found to be less trustworthy, possibly because of the challenges in monitoring and correcting inaccurate information. Overall, these shifts in trust highlight the need for individuals to exercise critical thinking and evaluate sources carefully, especially during times of crisis.

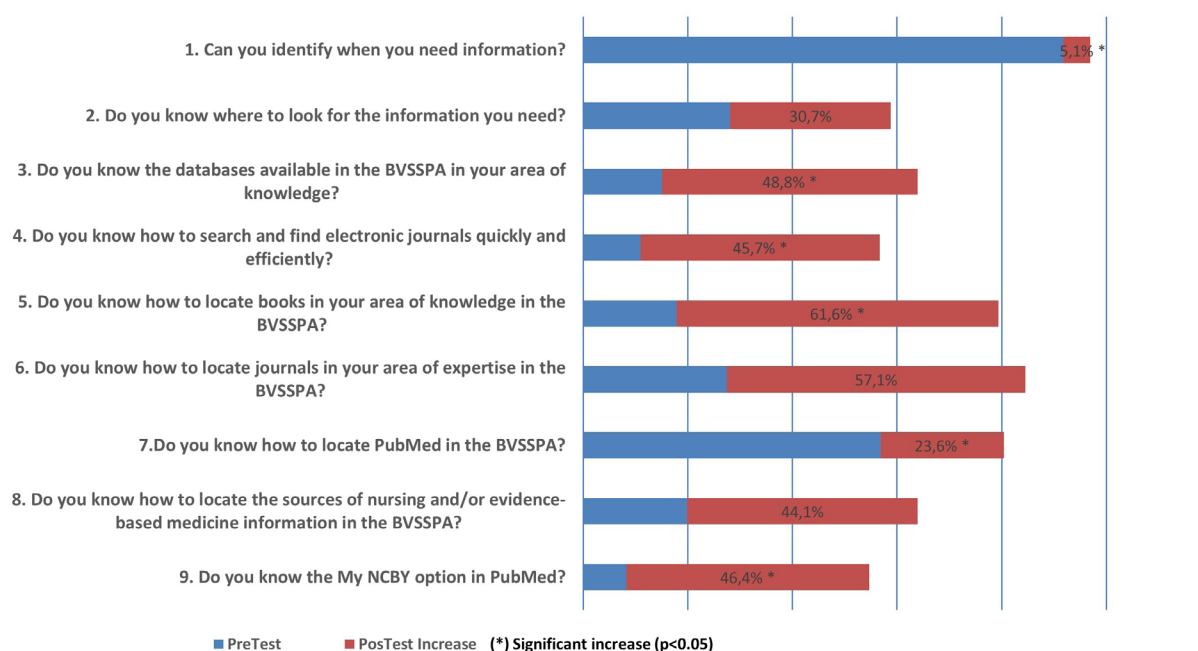
Open education has emerged as an effective means of disseminating knowledge and resources to professionals who seek to use them in their respective fields. The availability of open scientific and educational resources, including wikis, blogs, personal pages, and journals with open licenses, can significantly benefit professionals by providing them with the necessary knowledge and tools to support their practices. Moreover, utilizing these resources fosters a sense of recognition and belonging among users, who appreciate the value of being able to access relevant and high-quality resources to support their work. This recognition, in turn, can encourage greater participation and engagement within the open education community, as users become more invested in the development and improvement of these resources. Overall, the importance of open education resources cannot be overstated, as they

serve as a critical means of empowering professionals to enhance their skills and stay current with the latest developments in their fields.

The pilot program design was recognized as effective and was highly accepted among users who rated all the content, resources, and faculty. The differences in the use of library resources between Questionnaire 1 (C1) and Questionnaire 2 (C2), in which there was an educational intervention on the information resources available in the library, increased substantially, as shown in Figure 5.

The successful implementation of the first face-to-face training program supported by 2.0 technologies highlights the potential of technology to enhance learning outcomes and achieve training objectives. Furthermore, the subsequent virtual training program, conducted during the pandemic period, allowed for experimentation with innovative pedagogies and 4.0 technologies, which facilitated collaboration with other institutions in the field of open education and open science. The incorporation of digital skills into training programs is crucial for enabling learners to interact effectively within the digital ecosystem and take advantage of the wealth of resources available in the digital age. The use of technology in training and education can help bridge gaps in access to learning opportunities and promote inclusivity, particularly for learners who may face geographical, economic, or physical barriers to traditional classroom-based learning. Therefore, it

Figure 5. Increase in affirmative responses after training.



is essential to continue exploring and integrating technology into training programs to ensure that learners have access to the skills and resources they need to succeed in their professional and personal pursuits.

5. WORKING PROPOSAL FOR DEVELOPING A TRAINING MODEL FOR HEALTH PROFESSIONAL IN THE WORKPLACE.

As a result of this research, a model for forming Digital Competency from the Library with educational technologies 4.0 was created. To achieve success in a specific system, it is crucial to have a well-conceptualized model that highlights the important aspects of the system. The model serves as a valuable tool for disseminating knowledge and showcasing the understanding of stakeholders in the system.

The proposed model in this study emphasizes the integration of 4.0 technologies in the library platform for Lifelong Learning, with a focus on providing continuous training programs to healthcare professionals in the workplace. The objective of this model is to enhance the digital competencies of healthcare professionals, enabling them to excel in their clinical, teaching, and research practices. The integration of 4.0 technologies into the model offers numerous benefits, including improved access to information, increased efficiency in information management, and enhanced collaboration among healthcare professionals.

Furthermore, the proposed continuous training program plays a critical role in ensuring that healthcare professionals remain up to date with the

latest developments in their field, as well as with advances in digital technology. This approach to Lifelong Learning can help to bridge gaps in knowledge and skills and promote the ongoing professional development of healthcare professionals. The proposed model provides a valuable framework for improving digital competencies among healthcare professionals, with the potential to enhance patient outcomes and overall quality of care (See Figure 6).

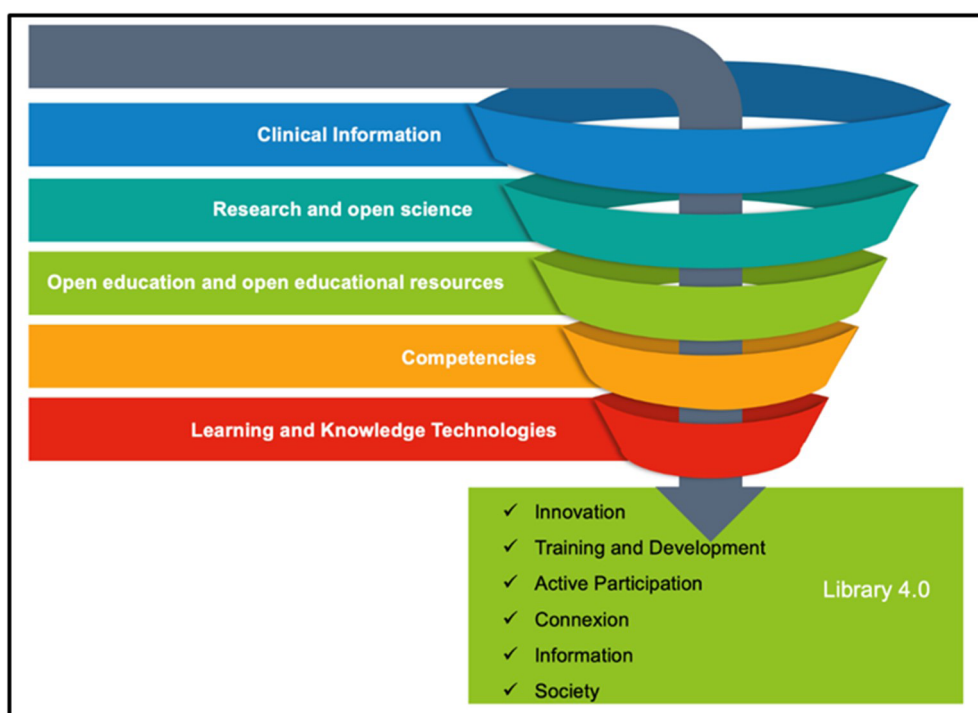
This model is designed for learning under the Lifelong Learning methodology and incorporates the ACRL competency areas, the professional competencies of the American Library Association, and the European DigCom competency framework. Its implementation can be conducted multimodal and openly. Our goal is to provide a collaborative design that leverages the power of digital technologies and can be made widely available at no cost. The proposed design is built upon open library platforms and leverages the benefits of the creative commons 4.0 license, which allows for the sharing and adaptation of creative works.

By integrating these open platforms with the creative commons license, our proposal promotes the democratization of knowledge and enhances access to educational resources for all. This is particularly important for those who may not have access to traditional educational resources, such as students from underserved communities or developing countries.

On the other hand, by hosting these resources in institutional repositories, we create a sustainable

Figure 6. Model's main components



Figure 7. Proposed model for the information of digital competency.

model for the ongoing distribution and use of the materials. This approach allows for the easy sharing and dissemination of knowledge across multiple platforms and ensures that the resources remain accessible to future generations.

This proposal offers a powerful and collaborative approach to education that leverages the benefits of digital technologies and open platforms. By making these resources widely available at no cost and under a creative commons license, we can help to democratize access to knowledge and promote lifelong learning for all. Facilitators, librarians, tutors, and teachers who collaborate in developing this learning should select this type of license. Figure 7 shows the model for the formation of digital competency.

6. DISCUSSION

The health library's online presence has the opportunity to adapt to the new digital environment and improve its online services to cater to the essential digital competencies required for professional learning. The library provides various navigation levels, such as catalogs, data management services (DMS), specific databases, and discovery tools. However, library web pages and discovery tools that integrate the catalog,

databases, books, Google Scholar tools, and other data management tools into a single interface are not used to their full potential (as shown in Figure 1). The ALA and OCLC publications have already highlighted this issue, indicating that libraries have lost their prominence in scholarly information seeking (Schonfeld & Housewright, 2010; Vaughan, 2011). Despite having access to these tools, readers are not aware of them or do not use them. Therefore, it is crucial to include these tools in the training programs on library tools and digital skills to improve their usage and ensure effective learning.

Electronic journals are the primary source of information used by healthcare professionals to update their knowledge and learn about the latest advances in the clinical area. The findings of the study indicate that health professionals predominantly rely on books and journals for gathering information related to their professional practices (as evidenced by Figures 3 and 4). However, the process of accessing these journals is complex, and professionals' resort to various search methods to obtain the desired information. Electronic journals have gained significant popularity in recent years, with their adoption rapidly increasing in global markets (Cordón-García, 2016, 2018). With the development of the Internet and its search systems,

users have access to a plethora of information sources, and libraries' offerings are not always the most attractive or preferred (Ávila-García et al., 2015). The virtual health library is widely present in clinical research, and there is a need to update teaching platforms to cater to the digital training requirements for professional learning.

The effectiveness of the competency training program has been well-established through various evaluation measures, including participant feedback, performance assessments, and objective outcomes, as Figure 5 shown. The program has been designed to provide a comprehensive and flexible learning experience that caters to the individual needs of health professionals. It encompasses various aspects of digital competency, including information literacy, data management, and communication skills, that are essential for professional development and success in today's digital age. The program's success can be attributed to its innovative and interactive approach, leveraging cutting-edge technologies and pedagogies to engage and motivate learners. Additionally, the program's continuous improvement cycle ensures that it remains up to date with the latest advancements in digital technologies and education, providing participants with a competitive edge in their professional endeavors.

The development of digital competencies is essential in today's world, where technology has become an integral part of our daily lives. With the increasing use of digital tools and platforms, it is essential to have the skills and knowledge necessary to navigate the digital ecosystem successfully. Digital competency training programs have been proven to be effective in improving these skills and ensuring that individuals are prepared to participate in a digital society (Gutiérrez-Martín et al., 2022). Without these competencies, individuals may struggle to access information, communicate effectively, and perform tasks that are increasingly reliant on digital tools. Thus, investing in digital competency training programs is crucial for individuals, organizations, and society as a whole.

The COVID-19 pandemic has forced educational institutions worldwide to adopt virtual teaching and learning models, which come with their unique set of challenge (Sáiz-Manzanares et al., 2022). It is essential to provide training to users who need to utilize information extensively in teaching, clinical, and research practices. With the pandemic highlighting the need for digital competencies, it presents an opportunity to prioritize training in these skills that are essential for current healthcare practices. By implementing user-friendly programs and technologies in virtual environments, healthcare

professionals can interact with innovation 4.0 methods to optimize library resources and acquire the necessary digital skills for the library's digital environment. Furthermore, training programs should aim to enhance the ability of professionals to use digital resources effectively, particularly those in the virtual environment, to improve their teaching, clinical, and research practices. This approach will help promote the integration of digital resources into the learning process and support lifelong learning.

The findings indicate that health professionals do not use digital information management applications and tools, as more than half of them indicated that they do not use them because they do not know them or do not know how to use them (Figure 2).

Digital reading assumes the use of digital devices and interaction with digital text, triggering the rise of textual communications (Escandell Montiel, 2019 Córdón-García (2015) supports the notion that digital media provides opportunities to integrate various hypermedia elements to interact and manage information. With the help of digital media, users can browse, access and reproduce audiovisual content, communicate with others through social networks, and stay connected in real-time. To take advantage of these benefits, users need to use applications and tools that enable them to create, access and share digital content. This has transformed the way people access and use information, making it more interactive and engaging. Digital reading is a new mode of reading facilitated using screens that provide mobility and flexibility to readers (Gómez-Díaz & García Rodríguez, 2018; Chartier, 2018; Gómez Díaz et al., 2018). The availability of e-books and electronic journals has significantly altered the traditional form of reading and has introduced new routines and workflows for libraries (Córdón-García et al., 2013, 2019). The development of digital technologies has expanded the scope of reading, with readers now able to interact with multimedia elements, hyperlinks, and social networks, transforming the reading experience into an immersive and engaging activity (Sánchez-Muñoz, 2019). The rise of digital reading has also resulted in changes in publishing and editorial practices, such as the emergence of new formats, the adoption of open access publishing models, and the integration of multimedia content.

The proposed model in this study aims to integrate the latest 4.0 technologies in health library learning, making it a platform for lifelong learning that can effectively combat the challenges posed by an "infodemic" during health emergencies

such as the COVID-19 pandemic. The need for reliable information sources has become more pressing than ever, and libraries can play a critical role in providing access to accurate and trustworthy information. However, to fulfill this role, library users need to possess digital competencies to navigate and evaluate the vast amount of digital information available to them (D'Agostino et al., 2017).

The pandemic has revealed the importance of digital technologies, which has accelerated their adoption in various sectors, including healthcare and education (García-Saisó et al., 2021). The availability of mobile devices, access to the Internet, and the proliferation of social networks have led to an exponential increase in the volume of information available. It is crucial to develop digital competencies to filter, analyze, and interpret the vast amounts of data and information available to healthcare professionals and students (Gutiérrez-Martín et al., 2022).

The role of libraries in this context is crucial in providing training programs that incorporate digital competencies and the latest technologies. The ability to use and access digital tools and resources effectively is essential for enhancing research, teaching, and clinical practices, ultimately improving patient care (Organización Panamericana de la Salud, 2021). The incorporation of 4.0 technologies in library learning can provide an immersive and interactive learning experience that better aligns with the needs of modern-day learners (Gutiérrez-Martín et al., 2022). By adopting a proactive approach in implementing these technologies, libraries can stay ahead of the curve and contribute to the development of a digital society.

The spread of an infodemic during the COVID-19 pandemic has been exacerbated by several factors, including the absence of digital literacy programs that adequately address critical issues such as: a) the challenges of searching, selecting, recommending, and disseminating reliable data and information; b) the lack of appropriate criteria and tools to obtain relevant information in the correct format and at the appropriate time; and c) insufficient knowledge of the use and importance of digital health applications. The pandemic has highlighted the urgent need to educate the public and implement ongoing training programs for healthcare professionals to enhance their digital skills in the digital age. By addressing these challenges, it is possible to improve information access, increase health literacy, and ultimately reduce the spread of misinformation and infodemics.

The model presented in this study outlines a comprehensive approach to learning and

development that adapts to the changing digital landscape of society. It emphasizes the importance of continuous learning and the integration of emerging technologies into education and training programs. The rapid pace of technological change requires individuals to develop and refine their skills throughout their lives to remain competitive and productive in the workforce. The model also recognizes the need for a collaborative approach that involves stakeholders from various sectors to ensure that education and training programs are relevant, effective, and aligned with the needs of society. By leveraging the latest technologies and fostering a culture of lifelong learning, individuals can stay ahead of the curve and thrive in the digital society.

7. CONCLUSIONS

It is crucial for healthcare professionals to undergo digital competency training to efficiently use information in teaching, clinical, and research practices. The COVID-19 pandemic highlighted the gaps in healthcare professionals' digital competencies, presenting an opportunity to prioritize training in these skills. In addition to traditional resources like books, journals, and bibliographic databases, healthcare professionals must be knowledgeable about the components of information in the digital ecosystem, such as digital information rights, licenses, alternative metrics, and open educational resources.

To achieve digital competency, librarians, teachers, health professionals, patients, education administrators, and society, in general, must express the urgent need for training and demand it from academic bodies. Innovative learning methods, e-learning, and m-Learning, which incorporate 4.0 technologies, are crucial to achieving digital competency. The proposed model supports self-directed learning through virtual and face-to-face library resources and services integrated into open virtual platforms.

The research emphasizes the need for ongoing training in digital competencies for healthcare professionals through practical, experiential learning. Implementing the proposed learning model can assess the efficacy of Education 4.0 methodologies and their impact on professional practices' innovation.

The particularities and limitations of the study are due to its specific geographic location in a public healthcare system in southern Europe, and further research is needed to expand its impact. Future research could include incorporating digital competencies into the professional curriculum and analyzing their implementation throughout

healthcare professionals' careers to investigate the competencies' impact on professional development and accreditation. The effectiveness and impact of Education 4.0 methodologies on innovation in professional practices could also be analyzed.

Overall, this research provides valuable insights for teachers, tutors, researchers, and decision-makers interested in developing the digital competencies of healthcare professionals.

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Antonia María Fernández Luque: conceptualization, data curation, formal analysis, research, methodology, visualization, and writing of the original draft as well as the review and editing of the article.

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