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Digital competencies of nurses: An interdisciplinary approach

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ABSTRACT
The digitalization of information has brought advances and challenges for human beings, with direct impacts on personal, social and professional lives. In the specific case of nurses, considering the importance of the work they perform in different areas of health, the need for studies that identify foundations and alternatives that enable the development of the digital skills of these professionals so that they can work efficiently and effectively, especially from the perspective of digital health, is highlighted. Thus, the objective of this article is to analyze, from an interdisciplinary perspective based on health, education and technology, fundamental aspects that need to be considered, within the scope of scientific research, for the development of digital competencies of nurses as agents of innovation in health. The adoption of bibliographic research in articles, legislation, and reports as a methodology has enabled results that can contribute to the advancement of these studies, including: the recognition of the importance and essentiality of digital skills; the educational perspective as a basis for the interdisciplinary development of these competencies; and the peculiarities of digital health as a driver and result of innovation.

Keywords: Digital skills, Education, Interdisciplinarity, Health, Nurses.

1 INTRODUCTION

The global scenario, according to Sá and Paixão (2016), has been characterized by complexities, unpredictability, and interdependence, generating challenges for countries, institutions, organizations, and individuals. Considering this scenario, the European Union, an economic bloc that is currently composed of twenty-seven countries, has issued, since 2006, recommendations for the members of the Bloc to invest in the development of skills considered essential for their citizens to be able to deal with these factors.

> Key competences are the skills that all people need for personal fulfilment and development, employability and social inclusion, and to adopt a sustainable lifestyle, live a successful life in peaceful societies, lead healthy lives and exercise active citizenship. They are developed in a lifelong learning perspective, from early childhood and throughout adulthood, through formal, non-formal and informal learning and in all contexts, including family, school, workplace, neighbourhood and other communities (COUNCIL OF THE EUROPEAN UNION, 2018, p. 7).

In addition to emphasizing the importance of essential competencies for issues related to personal, social and economic aspects that permeate the lives of individuals and society, the recommendations of the European Union also highlighted the importance of education for the

development of these competencies. According to UNESCO (2016), the provision of adequate educational conditions facilitates learning, which is an essential factor to enable the knowledge, skills and attitudes necessary for the full exercise of citizenship and access to job opportunities in a world that is undergoing rapid transformations.

In 2022, the *Educase Horizon Report* ratified the recognition of this scenario and identified strategies that can be adopted so that education can adequately respond to these demands, including: use of deeper learning approaches; focus on measuring and measuring learning; fostering cultures for innovation; learning analytics and *Big Data*; competency-based learning; restructuring of learning spaces; networked collaborative learning; and learning through hybrid environments, combining face-to-face and online actions (PELLETIER et al., 2022).

This position is amplified by Velenzuela and Cuéllar (2022) when they consider that education, due to the social and economic context, now requires: greater versatility, with the ability to reach more people for longer and with varied options; more personalization; support through ecosystems arising from interaction; and training based on skills, competencies and areas of interest to deal with the challenges of a digitized and ever-changing world.

However, according to Tosta et al. (2012), educational issues capable of supporting the development of competencies are not established spontaneously, and scientific studies and research are needed that effectively address the acquisition and expansion of essential competencies; and conditions for full access to citizenship and professional practice. This is a complex issue since, according to Spencer and Spencer (1993), a person's skills also depend on intrinsic factors such as motivation, values, self-image, personality and behavior.

Among the internal and external factors that have impacted and demanded more investments in the development of essential skills, the exponential technological advancement that has been experienced by humanity in the last hundred years stands out. By incorporating these technologies, especially digital ones, according to Oliveira et al. (2020), historical, social, and cultural transformations are effected that influence people's way of life and their relationships in society.

In this scenario, according to Roblek, Meško and Krapež (2016), computers, internet, smartphones, mobile devices, applications, programming languages, artificial intelligence, *big data*, internet of things (IoT), augmented and virtual reality, among other digital technologies, are increasingly being incorporated into people's daily lives and strengthening themselves as pillars of the economy and, therefore, the digital skills necessary for the use of these devices have also been considered essential.

The creation of the European Digital Competence Framework for Citizens (DigComp), the first version of which was published in 2013, is one of the main documents that exemplifies the efforts of European countries to face the new challenges. According to Vuorikari et al. (2022), the different

versions of the document, including the current one, DigComp 2.2 (2022), have been well accepted since they offer foundations considered efficient for developing digital skills, including the perspective that the learning that characterizes this development should occur throughout a person's life. Since then, several other initiatives, in several countries, have been consolidated around this theme.

According to Pereira et.al (2019), to be considered digitally competent, a person must have knowledge, skills, and attitudes that go beyond the simple use of these technologies. Ghomi and Redecker (2019) add to this perspective considerations that, in addition to enabling the critical and creative use of Information and Communication Technologies (ICT), digital competencies are considered transversal because they permeate and support the development of other competencies.

In 2021, UNESCO, according to Grizzle et al. (2021), published a document in which it highlighted the importance of policies, strategies, and action plans related to information literacy and skills development. In Brazil, according to Schuartz and Sarmento (2020), the need to address the development of digital skills from the perspective of education has also aroused the interest of professionals, researchers, institutions, and governments.

Among the Brazilian initiatives, Law No. 14,533, of January 11, 2023, which instituted the National Digital Education Policy; the significant increase in scientific publications on the subject; and the approaches of the National Common Curriculum Base (BNCC) that recognize the implications of the digitization of information and propose actions that instrumentalize individuals and societies for full citizenship in the face of new ways of working, communicating, establishing relationships and learning (BRASIL, 2017).

Considering the importance of this theme also for the health area, the objective of this article is to analyze, from an interdisciplinary perspective based on health, education and technology, fundamental aspects that need to be considered, in the scope of scientific research, for the development of digital competencies of nurses as agents of innovation in health.

2 DIGITAL SKILLS

According to UNESCO (2016), there are six sets of domains, represented by skills, values and attitudes, considered transversal to the formation of human consciousness: critical and innovative thinking; interpersonal skills; intrapersonal skills; global citizenship; media and information literacy; and others, the latter being an opening to different domains, according to the specificities of each situation presented.

In the context of this understanding, although media and information literacy is configured as another domain, the exponential advance of digital transformation in which, according to Vilaplana and Stein (2020), analog data is converted into digital data from the conjunction between information, informatics, communication and connectivity technologies, has fostered changes even in conceptual

terms, since, Gradually, the expression "digital skills" has been consolidated, encompassing understandings of literacy and literacy.

In 2006, the Council of the EU had already issued recommendations to its member states considering the scenario of changes that, at the time, pointed to the advancement of the globalized and knowledge-based economy. It was an action that, according to Mattar et al. (2020), although it was directed to the European continent, had repercussions and served as a reference for initiatives around the world, including Brazil.

These recommendations have been brought together in a document entitled the European Reference Framework. The objective was to present the context, objectives and essential competencies that citizens should develop throughout their lives so that they could face new social and economic challenges. Subsequently, in 2018, the eight core competencies were revised and currently include:

> literacy skills; multilingual skills; mathematical and science, technology and engineering skills; digital skills; personal and social skills and the ability to learn how to learn; citizenship skills; entrepreneurship skills; cultural sensitivity and expression skills (COUNCIL OF THE EUROPEAN UNION, 2018, p. 7).

According to the Council, these are skills that a person needs to acquire and develop in order to enjoy a healthy, inclusive, responsible, civic life and inserted in the labor market, and in order to develop these skills, a combination of knowledge, skills and attitudes is necessary where

> Knowledge is made up of facts, figures, concepts, ideas and theories that already exist and that facilitate the understanding of a particular sector of knowledge or discipline; Competences are defined as the ability and ability to execute processes and use existing knowledge to achieve results; and attitudes describe the willingness and mindset to act or react to ideas, people, or situations (COUNCIL OF THE EUROPEAN UNION, 2018, p. 7).

In the context of the recommendations,

> Digital skills involve the confident, critical and responsible use and use of digital technologies in learning, working and participating in society. These include information and data literacy, communication and collaboration, media literacy, digital content creation (including coding), security (including digital wellbeing and cybersecurity-related skills), intellectual property issues, problem-solving and critical thinking (COUNCIL OF THE EUROPEAN UNION, 2018, p. 9).

It is an approach from the perspective that people need to understand how digital technologies can support communication, creativity and innovation while being aware of their capabilities, limitations, impacts and risks. To this end, they consider that people must know the general principles, mechanisms and logic that underlie the development of digital technology, the basic functioning and use of different devices, networks and software.

It also highlights the need for critical attitudes towards the validity, reliability and impact of information and data provided through digital media, being aware of the legal and ethical principles

involved in the use of digital technology. In addition, according to the recommendations, people should be able to use digital technology to support active citizenship, inclusion, creativity and collaboration with others, in the personal, social or commercial spheres from an ethical, secure and responsible approach to the management and protection of digital information and identities.

Such conditions show recognition of the ubiquity of digital skills. According to Santaella (2013), this ubiquitous condition is identified because the technologies they use enable a continuous connection with information, communication and knowledge acquisition. The use of the plural and not the singular was also highlighted, that is, instead of digital competence, digital skills were used. This is a relevant aspect because it shows that the concept recognizes the factors that transcend the use of technologies from an operational point of view, giving it a strategic and permanent character in the personal, social and economic lives of citizens.

The EU Council's recommendations on digital skills have been used as a benchmark for numerous initiatives in Europe and several other countries outside the continent. In addition to DigComp and other documents derived from it, including DigCompConsumers; DigCompOrg; According to Santos et.al (2021), DigCompEdu and DigComp at Work also stand out: Enlaces (Chile), Competencias TIC para el desarrollo profesional docente (Colombia), Digital Teaching Professional Framework (United Kingdom), Digital Competency Framework (Canada), INTEF (Spain), and INCoDe 2030 (Portugal).

Analyzing these documents, it is possible to verify that they provide relevant parameters and content so that managers, educators, researchers, institutions and governments can formulate specific strategies and actions for the development of digital skills of a given target audience. Studies that evaluate trends in education, such as the *Educause Horizon Report* (2022), ratified this perspective while identifying the need for more studies, integrating different areas of knowledge, to take place in view of the ubiquity of these skills.

The interdisciplinary and ubiquitous nature of digital skills also leads to considerations about the importance of education so that people can develop them. This is a perception ratified by Siemens (2004) according to which the network society is a phenomenon that results from interconnection through digital technologies, generating changes not only in the way people share information, but also in how they learn.

3 EDUCATIONAL PERSPECTIVE

According to Hübner et al. (2018), the interest in the contributions of education to the development of digital skills is related to the advancement of ICT and the need to reduce knowledge gaps. It is an interdisciplinary perspective that was corroborated in the identified references,

considering that in them it was possible to observe the existence of an inseparable relationship between the development of digital skills and education.

In 2021, the Parliament and the Council of the European Union reinforced the recommendations issued in 2006 and 2018 by issuing a new document with a strong educational dimension called the Guide to the Digital Decade. The aim of this guide is to set the conditions for at least 80% of people aged 16-74 to have developed at least basic digital skills by 2030.

> Digital training and education should support a workforce where people can acquire specialised digital skills to obtain quality jobs and rewarding careers [...]. In the future, digital skills, both basic and advanced, will be essential to strengthen our collective resilience as a society: only digitally empowered citizens and a highly skilled digital workforce can be masters of their own destiny, confident and assertive about their means, value and choices (COUNCIL OF THE EUROPEAN UNION, 2021, p. 1).

It is a document that reinforces the perception that the digitalization of information has connected people and societies on a global scale, generating opportunities and challenges in a knowledge-based world economy (OECD, 2005). In this scenario, there is a growing search for strategies that are capable of anticipating and providing solutions in a scenario in which, according to Latour (2012), human and non-human actors act in an integrated manner.

The guide is presented as a reinforcement of the need to propose more studies and initiatives that collaborate for the creative and critical use of ICTs both in personal and professional life. It is also a document that recognizes the importance of education as a phenomenon that, through the teaching and learning processes, enables the development of digital skills.

Ferrari (2012) also aligns himself with this perspective of relationship with education by considering that digital competencies are constituted from 05 (five) dimensions: learning domains, including knowledge, skills, attitudes and strategies; means, considering what is necessary for the use of technologies; areas of competence, within the scope of problem solving, management, communication and collaboration; attitudes related to efficiency, effectiveness and autonomy; and purposes, referring to the context of work, consumption and citizenship.

The points of convergence with education can also be identified in Tinmaz et al. (2022) when they identified that, in scientific research related to digital competence, the terms digital literacy, digital skills, and thinking stand out. According to Reyes et.al (2021), digital literacy is a composition that includes computational, media, and information literacy. It is a condition that identifies digital literacy from a perspective that goes beyond the simple accomplishment of specific tasks.

Pengel et.al (2022) goes further by considering that, by bringing together technological, cognitive, and social skills, the term digital literacy gives way to competence because it does not only refer to essential technical skills, but also to the wise use and thorough understanding of information. Thus, digital skills, in addition to covering all types of literacy, go further because they use them, in

personal life and at work, for problem solving, security, information processing, content creation and communication, translating, once again, the essence of what is considered to be education.

For Pangrazio et al. (2020), the concept of digital competence is dynamic and its development is associated with issues that are based on learning actions that, according to Männistö (2020), must be collaborative and effective. A condition that necessarily goes through educational agents, since these professionals also need to present digital skills developed so that they can act as active agents in actions to support the development of other people. These are aspects that, according to Marzal et al. (2019), make digital skills play a relevant role in the generation and management of knowledge.

Fernández and Román (2021) reinforce these perspectives by proposing that improvements take into account advances in both technological and pedagogical areas. For this to happen, however, according to Choudhary et al. (2022), there is a need for changes in learning environments because, for the most part, they end up contemplating only the search for information and communication.

Projects capable of developing skills, at the same time based on pedagogical and digital foundations, could thus point out effective solutions, as is the case, according to Tomte and Buskovist (2015), of the TPACK framework (Technological Pedagogical Content Knowledge Structure) in which pedagogical, technological and content knowledge form an inseparable and productive context.

For Pérez et al. (2017), these changes and new needs were caused by the intensive and continuous use of the internet, since they resulted in changes in the way learning occurs. The possibilities arising from new ways of communicating and interacting are factors that, in the case of education, according to Torres et al. (2020), require new ways of teaching and evaluating. This also requires continuous evaluation of the use of digital resources and materials that are able to contribute to the implementation of active learning methods, including, for example, 3D technologies, immersive virtual environments, and mobile learning (DULEAVY et.al, 2019; IT WAS et.al, 2016; SILVEIRA, M and PETERSEN, 2017).

In the health area, ICT-related issues, according to Brink et.al (2022), have also been at the center of attention of governments and institutions because different indicators have been signaling the need for professionals working in these areas to also need to develop their own digital skills. For Basilotta et al. (2022), these agents have also recognized their deficiencies and, therefore, have been clamoring for support to train themselves and service users to use technologies such as augmented reality, mobile technologies, and telemedicine.

The intrinsic relationship between education and digital competencies in health is also an essential factor for improving the efficiency, effectiveness and capacity of its professionals to solve problems. In this context, Ferreira and Gomes (2009) consider that effectiveness consists in the relationship between what is intended to be achieved and the results achieved after the application of

available resources; while efficiency translates from the analytical relationship between the results obtained and the resources employed, considering a certain standard or reference.

These are aspects that, according to Matthews (2021), justify the need for actions aimed at the development of digital skills to consider the dynamic, disruptive, and progressive nature of ICT, and it is up to institutions to provide conditions and infrastructure for their employees to develop. Therefore, institutional support, based on innovation and infrastructure provision, is considered fundamental. According to Pinto-Santos (2022), however, these conditions are still far from the reality of several institutions and professionals due to, according to Artacho (2020), the lack of investments in the development of skills so that the effectiveness of actions is expanded.

For Hobbs and Coiro (2016), an approach that aims to support the development of these skills must consider, at least, the context and need; the objectives and expected outcomes of such learning; the contents; the practices to be adopted in the teaching and learning processes; the evaluation and how these actions and tasks will be connected to people's real needs.

In this dynamic context, Flores et al. (2020) identify educational agents as facilitators and motivators of the learning process. Thus, they need to be able to act effectively in the face of emerging challenges arising from the use of digital technologies. This includes, for example, the ability to deal with different teaching and learning methods and techniques, intelligent systems, open and disruptive technologies. For Brown et.al (2020), this is a situation that also strongly affects health since professionals in this area, including nurses, will increasingly use technologies to access data, manage records, provide online services, and use increasingly advanced equipment.

This is a scenario in which competency-based education has occupied a prominent place.

> In the context of a didactic-pedagogical approach that shifts its attention from the teacher to the student, from teaching to learning, encouraging student autonomy and the use of technologies to facilitate, expand and mediate the educational and social process, especially when having ICT as the object of teaching and study, the development of skills is understood as inherent to this training and education process (Mendes et al., 2020, p.307).

Torres-Alzate (2019) ratifies this understanding by considering that competency-based education presents itself as the best alternative since its approach is based on the perspective that a person's competencies are the result of the combination of educational processes, work, and life experiences. Frank et al. (2010) also have this understanding when considering it an appropriate approach to preparing health professionals to achieve results and solve problems.

> Competency-Based Education has the potential to improve community health only to the extent that context-specific health issues are used to determine desired competencies. Developing competency-based curricula to meet the health needs of the population is a process that begins first by identifying what those population health needs are; then defining the outcomes needed to meet those needs; and, finally, adapting the curriculum to achieve these outcomes (WHO, 2022, p.3).

According to Mendes et al. (2020), this view is based on the perspective of Perrenoud (2000, p.19) who defines competence as the "ability to mobilize a set of cognitive resources, such as knowledge, information, and skills, to solve a series of situations with relevance and effectiveness". Therefore, being competent means being able to mobilize specific knowledge to do something well. This mobilization process, however, is considered complex because it uses the analysis of probabilities, establishment of diagnoses, selection and criticism of information to make a decision.

> Competence, which can also be considered as a social construction, represents the way in which a person can equip himself with possibilities to build his action in the world around him, relating knowledge and its application. The understanding of competence in its cognitive, social and psychological natures (knowledge-skills-attitudes) reveals the complexity of the learning process that relates thought to action. What determines the competence of the individual is social knowledge and practical intelligence (MIRANDA, 2006, p.111).

In the case of digital skills, Cinque and Bortoluzzi (2013) consider them transversal because, from their mastery, it is possible to acquire other skills. This position is strengthened from the perspective of Giglio et al. (2015) that humanity is experiencing a socio-technological development characterized by interactive processes, where communication between people has become more agile and accessible, giving rise to a virtual network of relationships. It is thus a network society which, according to Castells (2007), can be understood as a social structure in which the technological paradigm has become the basis for the relations of production, consumption and experiences.

Siemens (2004) aligned himself with this view when addressing the theory called Connectivism, whose essence lies in the integration of principles explored by chaos, network, theories of complexity and self-organization. Thus, learning is conceived as a process that takes place within environments where the core elements are changing and only partially under the control of people. In addition, it is based on the notion that decisions are based on fundamentals that change rapidly and constantly.

> Connectivism also deals with the changes that many corporations encounter in knowledge management activities. The knowledge that sits in a database needs to be connected with the right people in the right contexts so that it can be classified as learning. Behaviorism, cognitivism, and constructivism do not refer to the challenges of organizational knowledge and transfer (SIEMENS, 2004, p. 6).

In Connectivism, it can be observed that the application of the concept of "Networks" in the epistemological and learning process is also one of its structuring axes. For Witt and Rostirola (2019), this theory of learning seeks the basis to understand how each individual, in connection with the world, constructs and produces interactive knowledge through the concept of Network. In this context, according to Siemens (2004), a network is understood as the physical or virtual space in which multiple connections occur through links or nodes for new knowledge.

Ausubel (2003) helped to consolidate this understanding by emphasizing the importance of what the author called meaningful learning, that is, a learning action that, in order to occur, depends on some fundamental premises, including: the fact that the quality and the way in which new information is processed by people depend on cognitive structures (subsumptive) and sensory experiences that individuals already had; the need to consider the social, cultural and economic context in which people are inserted; the student's willingness to learn; and the significant potential of the contents to be learned. Novak and Gowin (1999) added affective issues to this perspective as factors that also influence learning.

In view of the above, it is evident that the theories and currents corroborate the perspective that the development of competencies depends on the context, people's needs and the ability of educational agents to act as facilitators of this process, including, according to Brown et al. (2020), nurses whose eclectic nature of the profession requires both acting as educators and on the front line of care, in equipment operation and online services.

When addressing issues related to the development of digital skills, Basilotta et al. (2022), Brink et.al (2022), Torres et al. (2020), Guillén et al. (2020) and Pérez (2016) bring to light issues related to the use of media and technologies that are in use or are trends in health. This is an important aspect that is directly related to education because professionals, including nurses, need to be prepared to work and train other professionals to properly use these ICTs, including 5G technology, artificial intelligence, machine learning, blockchain, 3D printing, augmented reality, metaverse, internet of things (IoT), big data, smart devices (biosensors, trackers, wearables and apps), telemedicine, laboratory tests.

The importance of this set of factors collaborated, according to Tomczyk and Fideli (2021), for the creation of specific frameworks for the development of educators' digital skills, such as *Technological Pedagogical Content Knowledge*, UNESCO ICT *Competency Framework for Teachers* and ISTE *Standards*. DigCompEdu (2017) also highlights that, according to Lucas and Moreira (2018), the structuring aimed to configure a secure basis for guiding public policies based on logic, clear language and structures that can serve as a basis for technologies and other references that guide the development of digital skills of educators and teachers.

Brazil is not part of the European Union. However, this condition does not invalidate the recognition of the importance of the recommendations and frameworks aimed at the development of digital skills produced in that continent. Although there are differences between the challenges of other countries and those of Brazil, the bases have more similarities than differences. According to Mattar et al. (2020, p. 25), "these frameworks are important milestones for the understanding and development of digital skills, and there is no wealth and series of similar documents prepared in Brazil". In addition, according to Santos et al. (2021), compared to other initiatives, the DigComp series has been well

evaluated because the documents produced are part of a differentiated ecosystem where research and reports have been prepared by different actors in a collaborative way.

As already presented, it is understood that the contributions from documents aimed at the development of digital skills, including DigComp and its derivatives, are important references. However, the lessons learned from these experiences can only be used, according to Costa et al. (2022), if they are critically analyzed and combined with the specificities of the target audience.

4 DIGITALIZATION AND HEALTH

In healthcare, these aspects also stand out. The feasibility of cyberspace, which, according to Lévy (1999), is the means of communication that arises from the worldwide interconnection of computing devices, has highlighted potentialities and challenges that still need to be explored, mainly because it is an area whose advances depend significantly on the levels of competence of its professionals. Rowthorn and Olsen (2014) highlighted, for example, the need for health professionals to be able to deal with different types of ICT and care models, including virtual ones, so that personalized therapies, interventions, remote monitoring, and training can be implemented (RIZVI, 2022).

Also from the perspective of cyberspace, we highlight the considerations of the World Health Organization, which issued guidelines for the education of health professionals to be based on competencies based on the mastery of people-centered content, decision-making, communication, collaboration, evidence-based practices and personal conduct, factors considered fundamental for the development of a framework for global health (WHO, 2022).

In Brazil, the need to develop the digital skills of health professionals has also intensified, mainly as a result of strategies that have been adopted for the development of digital health, including telehealth and telemedicine, according to the regulations provided for in CFM Resolution No. 2,314, of April 20, 2022. Also noteworthy is CFE Resolution No. 0696, of May 17, 2022, which provides for the performance of nursing professionals in digital health based on parameters that include:

– Digital health understood from the use of ICT to produce and make available reliable information about the health status of those who need it, at the time they need it;

– Recognition of the possibility of nursing consultation, interconsultation, consulting, monitoring, health education and reception of spontaneous demand through ICT;

– Use of appropriate platforms capable of ensuring data storage and security, as recommended in the current General Data Protection Law;

– Observance of ethical standards compatible with the exercise of the profession.

In terms of international initiatives, the work of the World Health Organization (WHO) stands out, which has intensified its efforts to support governments and institutions in the development of

programs and strategies that enable the preparation of professionals for the appropriation of domains aimed at the full exercise of citizenship, improvement and expansion of services provided to the population.

Among the efforts already undertaken by the WHO, the creation of the Global Framework of Competencies and Results for Universal Health Coverage stands out, whose guidelines are aimed at

> Member States and educational institutions to support them in identifying the outcomes of the education of health professionals; integrate these skills into education programmes; establish standards for practice; and to construct performance evaluation instruments oriented to health services with quality standards that meet the health needs of the population. With this framework, WHO sets out its recommended approach to competency-based education outcomes for health workers; in doing so, it also provides conceptual and terminological clarity (WHO, 2022, p.5).

It is a document in which 24 (twenty-four) competencies, organized from 06 (six) domains: people-centered, decision-making, communication, collaboration, evidence-informed practice and personal conduct. According to Cometto et al. (2020), this is a recognition of the integration of skills at different levels, including the digitalization of information as a technology that enables connection on a global scale; the role of institutions as promoters of skills development; and the perspective that competency-based education is the most effective in preparing staff for professional practice.

In Brazil, there are also efforts to develop the skills of health professionals. Specifically in relation to nurses, we highlight, for example, the National Curriculum Guidelines for the Undergraduate Nursing Course (BRASIL, 2001) which are aligned with the WHO Global Competency Framework (2022), including in relation to the importance of education by highlighting: health care, decision-making, communication, leadership, continuing education, administration and management. Comparing the documents, it can be seen that the domains, competencies and skills can be grouped based on 04 (four) central themes: values, ethics and education; skills for communication, interpersonal relationships and teamwork; professional practice; management, leadership and decision making.

According to the International Council of Nurses (ICN, 2005), it should also be noted that the universe of work of these professionals depends on numerous conditions and factors and this means that the competencies necessary for each situation are translated through the combination of knowledge, skills and attitudes to be demonstrated by a professional in their daily practice or in the performance of their work. The presence of digitalization on a permanent basis also in this scenario reflects its importance and implies the need for constant studies aimed at identifying and developing the essential digital skills that are necessary for professional health practices, including nursing.

According to Egbert et al. (2018), in a study conducted to identify the essential competencies in informatics for nurses, in Austria, Germany and Switzerland, 15 (fifteen) areas that require more attention for the performance of these professionals in these countries were described: principles of informatics in nursing; applied informatics; data protection and security; nursing documentation;

information and communication systems for nursing; telematics and e-health; information management in research; information management in education; decision support; image and signal processing; quality assurance and management; biostatistics; project and process management; resource planning and logistics; and information and knowledge management in patient care.

Another work that has also contributed to the understanding of this scenario are the recommendations of the Technology Informatics Guiding Education Reform (TIGER). According to Thye (2019), it is a document that has been serving as a basis for institutional and public initiatives at the regional, national, and international levels. Its main objective is to support the formulation of frameworks so that nursing professionals can develop their essential digital competencies.

According to Hübner et al. (2019), the TIGER recommendations were designed based on the use of different methods and instruments, the use of scientific evidence, and the participation of nursing professionals. In its last update, which took place in 2018, according to Hübner et al. (2018), the 05 (five) of the main functions that these professionals can perform were considered, including: clinical nursing, quality management, interprofessional care coordination, nursing management, and nursing IT management.

In relation to clinical nurses, i.e., those who have direct contact with patients, the following essential digital competencies were listed by TIGER (2018): nursing documentation (including terminologies); information and knowledge management; Principles of Nursing Informatics; data protection and security; ethics and IT; information and communication systems (including interoperability); quality management; IT decision support; eHealth, telematics and telehealth (including interoperability); and assistive technology for aging people.

In this context, it is noteworthy that digital health, considered by the document as another competence in the form of eHealth, is an expanding area that, to a greater or lesser extent, encompasses all the other competencies identified in this framework.

> Digital health has been changing the way health services are organized and offered around the world, and Brazil is no exception. Health activities are closely linked to information and communication and depend on knowledge and technology to enable innovative, effective, effective, and efficient mechanisms that expand the reach and increase the quality, problem-solving, and humanization of the various aspects of health care (CRUZ et al., 2022, p.65).

According to Cruz et al. (2022), the need to develop digital skills as a result of the advancement of digital health has been recognized through international efforts, as it is an innovation in full development.

> The concept of innovation in health is the introduction and adoption of new processes, products, practices, programs or policies created to address a real problem and that are intended to bring significant benefits to individuals, groups, societies or organizations and privilege the social value of innovation, that is, it is not enough to be new or only a technological sophistication. but rather the positive results it produces for individuals or collectivities. Thus,

> innovation only exists when it generates value for people and society (SILVA et al., 2018, p.39).

Among the main tools in use that consider the inseparable relationship between digital health and the development of digital skills, the Global Digital Health Index (GDHI) stands out. It is an interactive service that enables the tracking, monitoring and evaluation of digital health around the world. Through online surveys, data are collected in collaboration with the ministries of health or digital health agencies of the countries, considering 07 (seven) categories of key indicators: leadership and governance; strategy and investment; legislation, policy, and compliance; standards and interoperability; infrastructure; services and applications; and, finally, deserving special attention, human talents (workforce).

The GDHI also presents itself as a platform for learning in which countries can inform, analyze and direct their investments in digital health, including in relation to the development of digital skills, considering the following indicators: digital health integrated with health and professional training; digital health integrated with health and in-service professional training; training of professionals to work in digital health; digital health; maturity of Careers for Digital Health Professionals in the Public Sector.

In the indicators of the GDHI model, according to Cresswell (2019), essential aspects are highlighted so that human talents can be able to work with digital health, including: the need for training that includes issues related to digital health for managers, technicians, community agents, support staff, nurses and doctors; permanent in-service training programmes through continuing education; and the training of manpower for health informatics, information systems and biomedicine.

In this context, Van Dijk (2020) observes that full and critical access to digital technology needs to be enabled through four (4) complementary phases:) motivation, attitude, intention and social support - by starting with motivation, the author signals that its absence or presence is the result of the personal, structural and cultural context in which the individuals find themselves;

b) physical access – represented by the availability and quality of access to devices, software and the internet;

c) access to skills – including skills related to the environment (operational; and formal); and related to content (information; communication; content creation; and strategic); and

d) Use – represented by the effective use of technologies according to need.

For Meira (2021), all of this is included in a new type of dimension called digital space, where, through articulation, the physical environment began to be enabled, augmented, and extended by the digital medium being, in real time, orchestrated by the social environment. For health, it is a process that gives rise to the need to put into practice an efficient strategic management of the health information life cycle where education, reliability, privacy, and economy are used in an

interdisciplinary way to enable agile, simple, easy-to-use, and measurable solutions. This is a context in which the development of nurses' digital skills is fundamental, given that these professionals are essential for the maintenance and innovation of health services.

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