



RESEARCH ARTICLE

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## HEALTH INFORMATICS: PERCEPTION OF GRADUANDS ABOUT ITS APPLICATION IN THE NURSING PROFESSIONAL PRACTICE

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### ABSTRACT

**Objective:** To understand the perception of nursing students on the application of informatics in health from the perspective of competencies recommended by the National Curricular Guidelines of the Nursing undergraduate course. **Methods:** Exploratory, descriptive study with a quantitative approach, performed with 84 Nursing students from the Federal University of Pernambuco (UFPE), who had attended the Informatics Applied to Nursing subject between the years 2014 and 2015. A semi-structured instrument was used for data collection and analysis, descriptive statistics. **Results:** More than 50% of the students perceived usefulness, advantages and disadvantages of the classes of health information systems, showing inconsistencies in the perception regarding their application in practical nursing. **Conclusion:** The findings showed that, although most students have knowledge about different classes of tools of information and communication technologies and their applications, gaps regarding some concepts and processes of use were evidenced.

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## INTRODUCTION

The historical trajectory of the use of informatics in nursing begins in the 1950's in the United States in which computers started to integrate the hospital care (Juliani, Silva and Bueno, 2014). In this context, the increased use of informatics in health allowed for more accurate and effective procedures, reducing human errors (Barra, Sasso and Almeida, 2015). In Brazil, the increments of computers to nursing occurred more than 40 years ago, with the 1980's as a milestone in the first publications directed to this profession. In this context, schools and universities are beginning to unite the Information and Communication Technologies (ICT) for the teaching of nursing by providing new ways to assist in teaching, management and research (Kobayashi and Leite, 2015). In nursing, advances in technology allow for the nurse to access data with greater ease and agility, removing the bureaucracy of the service, better optimizing the time employed in the care and data record, facilitating the multiprofessional communication and with the patient, integrating the information more efficiently and securely, and subsidizing the decision-making process (Barra, Sasso and Almeida, 2015). However, although information technology is a popular theme in the literature, media and education, studies have evidenced that nursing professionals still do not have a clear understanding of its use in their professional practice, which may be related to a lack of perception that informatics is a concrete possibility that can be integrated to complex activities of care practice (Brandão and Silva, 2015; Brasil, 2001). This fact indicates educational needs in the nursing area, in order to prepare the student for this growing area of knowledge (Foster and Sethares, 2017). In this sense, through the National Curricular Guidelines (DCN – *Diretrizes Curriculares Nacionais* in Portuguese) for Nursing Undergraduate Courses, in 2001, the Ministry of Health (MOH) regulated powers and general and specific skills that should be present in the nurse's education, providing them knowledge that can assist in the use of new information and communication technologies (Santos, Guimarães and Abe, 2017).

According to this perspective, the expectation is not to instruct students in basic computer skills, but to qualify new professionals with skills and knowledge to apply computerized resources in professional practice (Brazil, 2012). Thus, one defends the creation of subjects incorporating the reasoning required to familiarize the students with Nursing informatics, so that they can understand the application of these resources in professional practice and are encouraged to think critically about the use of the computer in different areas of the nurse's performance (Foster and Sethares, 2017). Based on the DCN (Brazil, 2001), the pedagogical project of the Nursing Undergraduate Course at the Federal University of Pernambuco (UFPE) received some changes in the its curriculum, in order to ensure the academic quality of higher education. In this way, the subject "Informatics Applied to Nursing" began to be part of the compulsory subjects of the course in 2011, introducing the main concepts of health informatics and its applications in research, teaching, administration and service direct to the Nursing field. The classes of the subject occur at the computer lab and its program includes concepts and applications of computerized tools in various nursing scenarios. Some of the tools covered include the classes of systems of: i) Electronic Patient Record

(EPR), which, among its functions, ensures greater privacy and confidentiality of the information, quickly and simultaneously accessible (Martins and Lima, 2015); (ii) Health Decision Support Systems (HDSS), whose use combined with the professional's knowledge can guide the choice of the best care to be provided to the patient (Jin *et al.*, 2014); (iii) Health Information Systems (HIS), used in almost all the nurse's actions for the collection, processing, storage, analysis and dissemination of information (Brandão and Silva, 2015); and (iv) computerized Nursing Care Systematization (NCS), which combines the technical and scientific knowledge of the professional, information about diagnosis, interventions and outcomes most appropriate to the patient (Pissaiá *et al.*, 2016). These computerized systems are presented in the subject and used in practical activities to prepare and stimulate the production of a critical and reflective thinking in the student for a future use, application and (re)formulation of computerized tools (Foster and Sethares, 2017).

This subject adopts a problematization methodology using the development of projects and resolution of problem-situations to discuss the use of technological resources in actual contextualized practical situations of Nursing care, teaching and research. In addition to its usual benefits, the adopted problematization enables the record of the constructive process of learning, working as a diagnostic feature on the level of students' development, their difficulties and potentialities. Therefore, it encourages the identification and adjustment of difficulties through constant constructive re-elaboration of projects of students (Luna, Pinheiro and Teixeira, 2018). With its pedagogical problematizing perspective, the subject brings as assumptions the student's active learning, with a view to a greater awareness and autonomy in the decision-making process, preparing him/her to meet the challenges posed by technology for clinical decision making, for the management of care quality and to determine the appropriate care (Luna, Pinheiro and Teixeira, 2018). In the subject context, some of nursing students presented difficulties to acquire knowledge and appreciate the implementation of ICT in nursing professional practice. The perception referred to was obtained when verifying students with low levels of performance in relation to attendance and interest, as well as a fragile appropriation of concepts of the subject. Considering this reality, the present research aims to analyze the perception of nursing students on the application of informatics in health in professional practice considering the necessary skills in the use of information and communication technologies in nursing professional processes.

## MATERIALS AND METHODS

This is an exploratory, descriptive study with a quantitative approach, performed at the Nursing Department of UFPE. The study population was composed of students from the Nursing undergraduate course duly registered in the aforementioned institution of education and who had attended the subject "Informatics Applied to Nursing" between the years of 2014 and 2015, totaling 116 students. Of these, 84 consented to participate in the study and 32 did not participate: 12 refused to participate and 20 were out the research site during collection, even after five consecutive attempts with varying time intervals. For data collection, a semi-structured questionnaire was used, built from applications of classes of

computerized tools in different scenarios of health practice. The study variables referred to sociodemographic information, knowledge and student's access to information and communication technologies; knowledge about the nursing informatics; applicability of computerized tools in nursing practice and nursing skills in information technology established by the DCN. The researchers applied the questionnaire during the interval of classes in March 2016.

The data were analyzed by means of descriptive statistics using Microsoft Excel 2016. The tables were arranged by grouping similar variables according to the implementation context of classes of computerized tools. The present study is in accordance with regulations of the Resolution of the National Health Council (CNS) n. 466/2012, being approved by the Research Ethics Committee (REC) of the UFPE of the Social Sciences Center (SSC), under CAAE: 52297215.2.0000.5208 and opinion: 1.435.701 on 03 March 2016. All participants were informed about the research and signed the Informed Consent Form (ICF).

In this study, most students, 18.4% (n=83), used the internet for academic and professional work, with 16.6% (n=75) for communication in social networks, 15.9% (n=72) entertainment and fun, 15.7% (n=71) to read the news, 15% (n=68) for downloads, 11.9% (n=54) for banking and shopping, 3.6% (n=16) for participation in the forum for discussion and 2.9% (n=13) for online gaming. Table 1 presents the frequency of responses of students regarding their perception of the usefulness of HIS tools. The responses were not mutually exclusive. Concerning the HIS, there was a higher percentage of students who reported understanding the usefulness of these systems for safe and effective storage of health information. However, some students reported considering the use of health information systems only for managerial purposes (Table 1). Table 2 shows the frequency of students' responses regarding their perception of the usefulness of EPR and HDSS. These results were condensed into a single frame, once these ICT resources are complementary in the

**Table 1. Students' perception about the usefulness of Health Information Systems. Recife, Pernambuco (PE), Brazil, 2016**

Health Information Systems (HIS)	N	%
Safe and efficient storage of health data.	75	38.5
Characterization of a population for studies and research.	46	23.6
Not very useful, increasing the time spent on bureaucracies.	0	0
Use solely for management purposes to reduce unnecessary costs.	5	2.5
Detection and recording of population health data and disease notification.	69	35.4
TOTAL	195	100

Source: Own authorship.

**Table 2. Students' perception about the usefulness of Electronic Patient Record and Health Decision Support Systems. Recife, Pernambuco (PE), Brazil, 2016**

Electronic Patient Record (EPR)	n	%
Professionals who have no computer skills could delay the service.	9	9.5
The benefits of EPR are smaller than its implementation it in the service.	2	2.3
It is important to look for a transition from paper to electronic medical records.	80	85.1
The paper record has been fulfilling its purpose well.	2	2.1
It has advantages and disadvantages.*	1	1
TOTAL	94	100
Health Decision Support Systems (HDSS)		
Choosing a more appropriate and individualized care or treatment through a system which, combined with the nurse's scientific knowledge, helps to clarify the most likely diagnosis for the patient's signs and symptoms.	76	50.6
The clarification of doubts, serving as support in decision making.	62	41.3
Besides not having benefits, it makes the professional have a better accommodation with the aid of software to always tell him what to do.	1	0.7
Care will occur equally, so that the same treatment can be applied to people with the same clinical signs.	10	6.7
I see no use, as there is still need for regulation allowing for its use in the health network.*	1	0.7
TOTAL	150	100

\*Text written by the student regarding the "other" option of the questionnaire.

Source: Own authorship.

## RESULTS

The participating nursing students were predominantly female (n=78; 93%) and with an average age of 23.5 years (SD  $\pm$  3.8). Of the 84 students participating in the study, 92% (n=77) had a computer for own use. With respect to knowledge in basic computing, 64.4% (n=54) rated their knowledge as good, 26.2% (n=22) as very good, 4.7% (n=4) as great and 4.7% (n=4) as bad. Regarding access to internet, considering that the responses were not mutually exclusive, 34.1% (n=72) reported accessing the internet at home with broadband connection; 20.8% (n=44) in public places by WI-FI; 15.2% (n=32) in the laboratory of informatics of the university; 14.3% (n=30) at home through 3G/4G connection; 12.3% (n= 26) at the house of relatives or neighbors; 1.9% (n=4) at LAN houses and 1.4% (n=3) by other means of access.

provision of subsidies for decision making in the patient care, especially in the steps of anamnesis and physical examination. The responses were not mutually exclusive. In relation to the EPR, the study showed that more than 80% of the students reported perceptions recognizing the advantages of this resource in care practice, also showing that 13.9% indicated structural deficiencies, hindering the use of this tool (Table 2). In relation to the use of HDSS, more than 90% of the students recognized their usefulness in decisions for the definition of the most appropriate and individualized treatments for the patient. Nevertheless, less than 2% reported not seeing benefits in its use (Table 2). Table 3 presents the frequency of responses regarding students' perception of the usefulness of the computerized NCS and terminologies in nursing, grouped in the same frame considering the use of terminologies as facilitating resources in the record and standardization of

information of the NCS. The responses were not mutually exclusive. About NCS, more than 90% of the students reported that they understand the many advantages of its computerized process, such as optimizing the time and greater security in the record of patient data. Nonetheless, approximately 4% of the students reported difficulties of adhering to it due to the current large volume of nurses' work at health services (Table 3). Regarding the use of terminologies, more than 90% of the participants realized the advantages of their use in the standardization of health data. However, a little more than 3% of the students perceived difficulties and challenges in their usefulness, such as the necessary adoption of a standardized classification system in health institutions and the difficulty remembering the terms to be adopted (Table 3).

Table 5 presents the applicability of computerized resources at various levels of the health care as the point of view of nursing students. The responses were not mutually exclusive. According to the results, the EPR was the computerized feature that, according to the students, would have a greater application in various scenarios of health care, unlike the HIS, whose usefulness had the slightest recognition. The analyzes of the results of the present study showed that more than 50% of the students perceived usefulness, advantages and disadvantages of the classes of health information systems, showing, however, inconsistencies in their perception regarding the application in nursing practice of tools: health information systems, electronic patient records, nursing assistance systematization and nursing terminologies.

**Table 3. Students' perception about the usefulness of Computerized NCS and Terminologies. Recife, Pernambuco (PE), Brazil, 2016**

Computerized Nursing Care Systematization (NCS)	n	%
It improves the quality of patient care and optimizes time.	73	39.2
It contributes to the continuity of assistance and provides more security in data recording.	62	33.3
It does not bring significant benefits for nursing, with difficult acceptance of.	0	0
There are difficulties in its use due to the large volume of service calls.	7	3.8
It minimizes the risks of patient data exposure.	43	23.2
Others	1	0.5
TOTAL	186	100
Nursing Terminologies		
It creates terms that are difficult to remember, hindering professional practice.	3	1.9
It defines a standardized nomenclature, facilitating diagnoses, interventions and expected outcomes through international councils and associations for better identification, treatment and survey of health problems.	80	48.5
It makes the nurse's life difficult, because you never know which one to use, ICNP* or NANDA-I†.	2	1.2
Record of events and nurses' activities, being important for individual support and guidance of the action of other members of the multidisciplinary team.	30	18.1
I see great utility in the use of terminologies allied to computerized solutions. They allow for standardized records of clinical and administrative data.	50	30.3
TOTAL	165	100

\*International Classification for Nursing Practice; †North American Nursing Diagnosis Association-I. Source: Own authorship.

**Table 4. Students' perception about the usefulness of Telehealth. Recife, Pernambuco (PE), Brazil, 2016**

Telehealth	n.	%
Monitoring and care for the distant patient.	52	21
The exchange of information and experience by professionals, improving care.	75	30.4
Continuity of care by qualified professionals, even in distant locations.	57	23.1
The learning generated by the exchange of experience between students and professionals, even if distant.	56	22.7
It only complicates professional practice, besides being little used, it is an improper expense that could be used in something we need.	1	0.4
I find it difficult to use telehealth in the reality of our health service. We have organizational and resource difficulties to use it successfully.	6	2.4
TOTAL	247	100

Source: Own authorship.

**Table 5. Students' perception about the usefulness of computerized systems at health care levels. Recife, Pernambuco (PE), Brazil, 2016**

Classes of Health Systems/Terms	Primary Care n(%)	Secondary Care n(%)	Tertiary Care n(%)
HDSS	55(17.0)	59(16.3)	61(16.8)
Telehealth	51(15.8)	53(14.6)	57(15.8)
Computerized NCS	55(17.0)	71(19.6)	67(18.4)
EPR	62(19.4)	76(20.9)	69(19.0)
HIS	47(14.6)	48(13.2)	48(13.2)
Terminologies	52(16.2)	56(15.4)	61(16.8)
TOTAL	272(100)	363(100)	36(100)

Source: Own authorship.

Table 4 presents the frequency of students' responses regarding their perception of the usefulness of resources of telehealth in Nursing. The responses were not mutually exclusive. About Telehealth, there was a higher percentage of students, almost 99%, who realized its contribution to the quality of distance education and assistance, but approximately 3% believed that its difficult use results from the lack of resources of some health services (Table 4).

## DISCUSSION

This study found a greater predominance of female students, corroborating the results of other studies (Corrêa *et al.*, 2018). Historically, nursing has always been linked to "caring", an activity socially linked to the female group (Bublitz *et al.*, 2015). With respect to age, there was a young profile among students, which may be related with the encouragement of the

Brazilian government to the admission of students to higher education through the National High School Exam (ENEM - *Exame Nacional do Ensino Médio* in Portuguese) (Bublitz *et al.*, 2015). Most Nursing students had a computer for own use. Another study conducted at a private institution of the state of Maranhão showed that most nursing students use the computer to study school subjects (Morais *et al.*, 2018). In recent decades, the use of technological resources has intensified greatly. According to the synthesis of social indicators of the Brazilian Institute of Geography and Statistics (IBGE), the possession of computer in 2014 reached 42.1% of the urban households (Brazil, 2015). Regarding the access to internet, the nursing students had more fast and easy means of connection. Quick access to the network content allows for students to manipulate updated data more efficiently, providing the means to expand knowledge and critical vision (Bublitz *et al.*, 2015). This study showed that most nursing students used the internet to make academic and professional works. In this sense, the internet is a tool to integrate greater knowledge to the teaching-learning process (Morais *et al.*, 2018). Concerning skills in informatics, more than half of the nursing students considered their level of knowledge as "great" or "very good". A study conducted at a private institution in Caxias also investigated the skills of nursing students regarding their computer use, in which 74% considered themselves "good users" and 15% self-assessed as "very fluent" (Leite *et al.*, 2013). In what concerns the perception of students about the usefulness of ICT for nursing, most students understood them properly considering their applications, goals and benefits. This reveals a future professional with a more receptive profile to such technological innovations and who believes the improvement of assistance through their use. In a study in Paraná with nurses, whose guiding question was "the perception of nurses about the use of computer at work", there emerged categories that pointed to the positive and negative aspects in the use of the computer. The category that expresses the positive aspects based on nine sub-themes: "Easy access of information; Agility in decision-making and in care; 24-hour Support of Service of Informatics; Security of information and care; Availability of more time for the patient and family; Smaller displacement from the sector/place of work; Economy of paper/printed; Data organization; and Access to global information of the patient"(Matsuda *et al.*, 2015). Regarding the negative aspects, this was composed of four sub-themes that were related to technical and operational aspects: "Copy of prescriptions and reports; lack of computer terminals in the nursing station; Need for portable or handheld computers (palmtop, tablet, laptop); and the need for periodic training/updating" (Matsuda *et al.*, 2015).

Equally, even though most nursing students perceive these technologies as a means of contributing to the professional practice, some had a different understanding, either by own inexperience or lack of interest, as well as considering that the disadvantages outweigh the benefits of these systems. The use of informatics and information and communication technologies has been providing various scientific and technological advancements that have revolutionized the processes of nursing assistance and result in significant gains for the nurse (Gabassa *et al.*, 2015). Nevertheless, the popularization of computing technologies also exposes this professional to great challenges of adaptation and habituation to these systems (Matsuda *et al.*, 2014). Most nursing students

have fragmented understanding about the systems, justified by their perception that ERP and Computerized NCS, for example, as tools with greater applicability at each level of attention, but HIS as not so useful. Even though the understanding of the nursing student has been inaccurate regarding health information systems, these are a "set of interrelated components that collect, process, store and distribute to the decision-making process within strategic and operational aspects" (Bittar *et al.*, 2018). Considering information-based health organization, and, in this case, the record of multiple information about the condition of the patient in the ERP and the documentation of the steps of the NCS, consequently, to perform these actions, the professional will be making use of HIS. Also relating to HIS, regarding its usefulness, students consider them as a set of systems, which, in addition to safe and efficient for data storage, contribute in the context of epidemiology in health. In contrast to the expected, some nursing students defined HIS as management-exclusive systems. However, we know that, although initially directed only to the financial, administrative and statistical control, it has been currently used to subsidize a quality assistance, assisting in data collection, storage and processing of information (Pineiro *et al.*, 2016).

In relation to the vision of the ERP, the students considered numerous advantages arising from its use, however, if compared to other systems, there was a greater proportion of students with statements contrary to its use. This result corroborates the findings of other articles, including the study of Paraná, in which, although the interviewees expressed satisfaction with the tools, they pointed out as negative the possibility of copying and pasting important information of the patient in its entirety, neglecting its reflection and analysis, and the current clinical condition of the patient, violating the Code of Professional Ethics (Matsuda *et al.*, 2015). Differently from the past, in which the doctor had independently almost all information necessary for the care of the patient, currently, the responsibility of the patient began to be divided by different medical specialties and other professionals from the health area, including nurses. According to the guidelines of the Nursing Undergraduate Course, the future nurses must acquire competence to "maintain the confidentiality of information entrusted to them, in the interaction with other professionals and the general public" (Brazil, 2001). The ERP allows for the sharing of information between different health professionals quickly and simultaneously; in addition to improving the readability of the record; reduced storage space and increased security and reliability of the information (Martins and Lima, 2015). Thus, the nursing student must understand and learn to operate properly this tool, which also assists in decision making in directly. Furthermore, the students realized well these aspects, possessing a correct view of their practical use, considering the answers obtained in the discussion of this study. In relation to the usefulness of Terminologies, the present study showed that the student believes that the advantages of using terminologies can overcome the difficulties presented. The students demonstrated understanding their concept and practical application, as shown in other studies, which include representation, structuring, grouping and coding of clinical data, serving to facilitate and to compare the knowledge globally (Maciel, Ferreira and Marin, 2018). About the disadvantages observed in the use of terminologies, there stands out the challenge for

the adoption of a standardized classification system for the nursing professional practice, situation reported in other studies (Maciel, Ferreira and Marin, 2018). There is a use of the International Classification for Nursing Practice (ICNP) in health computerized systems; however, in the professional practice of Nursing, there is a more frequent use of the North American Nursing Diagnosis Association-I (NANDA-I) (Cavalcante, Larocca and Amaral, 2017). There stands out the importance of nursing appropriating these terminologies, to improve and ensure the quality and safety of the care provided. Concerning the Computerized NCS, one may say that the student understands that its elaboration brings major benefits to professional practice, being one of the ways used by nurses to apply their scientific and technical knowledge in patient care. The electronic tool for the elaboration of the NCS supports the activities of care systematization, proposing diagnoses and interventions focused on the patient, but, in addition to depending on the professional knowledge, it does not replace the clinical reasoning, critical thinking and decision making that are exclusive competence of the nurse during the development of the nursing process. Furthermore, incomplete information may interfere in all procedures that will be taken later, leading to a diagnostic reasoning, sometimes, mistaken (Ribeiro, Ruoff and Baptista, 2014). In a smaller percentage, this study showed that the nursing student presented a correct perception of difficulties related to implementation of the NCS, once the nurse normally presents an accumulation of functions and has difficulties with the time required to carry out his/her work process (Ribeiro, Ruoff and Baptista, 2014). As for the class of Decision Support Systems, which include computerized systems discussed in the present study, this one showed greater acceptance by the student, because it presented a minimum percentage of disadvantages, if compared to other systems. This shows the perception of the student regarding contributions and utility of this tool. The class of Decision Support Systems assists in the selection of the best professional procedure in health. Decision is a constant exercise of clinical practice. It is part of the jurisdiction of "Decision Making", as contained in document of the DCN, and must be worked during the nursing graduation, so that the student may have skills and abilities to assess, systematize and decide on the most appropriate behaviors based on scientific evidence (Brazil, 2001).

The computers and technological resources can help with the decision making, generating direct and indirect benefits. Indirectly, there is improvement in the ambiance and the exchange of information between professionals. The direct benefits focus on patient safety in a general way, ensuring reduction of errors of annotations, reduction in errors related to medication administration, in addition to serving as monitoring for future trainings (Matsuda *et al.*, 2014). In relation to telehealth, most students revealed an adequate perception regarding the intended use of the tool. The exchange of information was the most obvious advantage for the improvement of health care from the perspective of the students. The current research confirms the benefits of telehealth evidenced in studies, such as reduction of costs, the encounter between professionals to reflect on the best assistance, both in basic care of urban areas, reducing the forwarding to other care levels, as well as in rural or remote areas (Piropo and Amaral, 2015). The definition of telehealth differs from the concept of telemedicine, because while the

latter refers to the use of ICT to support medical assistance to patients in distant places, the first has a much broader meaning, covering teleeducation, support for health research, support for management and telemedicine (Piropo and Amaral, 2015). In this way, access to training courses taught in distance education platforms, such as those offered on the *Universidade Aberta* - Unified Health System (UNA-SUS), also part of the telehealth, correlating with the acquisition of competence of permanent education, in addition to the communication. Moreover, Telehealth also relates to the competence of administration and management, considering the use of teleconferencing or teleconsulting, for example. The nursing informatics skills are acquired through professional practice and experience, all this coupled to a theoretical knowledge, thus forming skills and attitudes necessary not only focused on the use of the computer, but on many areas of their professional practice with the help of computerized tools (Foster and Sethares, 2017).

Nursing undergraduate students must acquire, throughout the undergraduate course, a learning that allows for them to be able to operate and use the tools of ICT effectively in their professional field. To do this, they must go through a process of sensitization and training to deal more effectively with these tools. This requires the integration between knowledge and development of computational skills and competencies in nursing education. During the graduation, nursing students need to be prepared to deal with possible demands of the future professional, which will require theoretical domain of content and practical skills. As the world of work undergoes changes, the institutions begin to require a professional profile in constant development (Treviso *et al.*, 2017). In this context, there stands out the importance of acquiring competences and skills geared to the use of ICT, recommended by the DCN. Thus, indirectly, there is the relevance of the changes proposed by the political pedagogical project of the Nursing Undergraduate Course at UFPE, which is based on a pedagogy that encourages the formation of competencies in students, according to the recommendations of the DCN. The subject Informatics applied to nursing of the Nursing Undergraduate Course at UFPE, in addition to preparing the student to use computerized tools, stimulates the production of a critical and reflective thinking about the implementation and formulation of IT tools in the reality surrounding the professional, thus exploring the ethical and legal concepts of these competences (Foster and Sethares, 2017). In this way, it differs from university courses that "offered" the subject of nursing informatics, but addressed only basic computer concepts. Therefore, the subject contributes significantly to the student's ability to reflect on the complexity and the potential use of computational tools in the structure, organization and functioning of health systems and services, guaranteeing the quality of nursing care and assistance. Collaborating in the development of skills such as decision making, communication, administration and management, and permanent education, as well as indirectly for the skills of health attention and leadership.

## Conclusion

The nursing students that participated in the study, in general, managed to realize the practical applicability of each class of system addressed. Expressing that they understood the meaning of the implementation of ICT in terms of advances in

quality, safety and access to information in the processes of care, management and teaching/research in nursing. Nonetheless, there were gaps in the perception of some students, as follows: In relation to the HIS, there was an understanding that this class of systems could only be used in management; For EPR, students did not know exactly the usefulness of this class of systems, since some reported that its benefits cannot overcome its costs, and still felt that, despite its character of modernity, it could delay the completion of service; Regarding the Computerized NCS, some students reinforced the accumulation of tasks of the nurse as difficulty to perform its appropriate record, disregarding the practicality of computerization and the benefits obtained with the same in terms of qualification of patient care and management of the service; Concerning the use of nursing terminologies, some students mentioned that the challenges consist of adopting a standardized classification system, as well as difficulty to remember the terms to be used, constituting obstacles for nursing to get hold of them, completely ignoring that these barriers can be minimized exactly with the use of ICT. We emphasize the relevance of informatics in health in nursing undergraduate education and, in particular, its inclusion as cross-sectional content, i.e., that its content is part of all stages of the process of nursing students' education, so that they can be challenged to experience its application in care, teaching, administration and research during the graduation, aiming at the construction of a praxis of transforming education. Therefore, more researches about the theme should be developed, with the aim to verify how the subjects of informatics in nursing offered by educational institutions have contributed to the acquisition of professional skills. The knowledge of the student's perception in this context reveals educational needs in this area, which will contribute to the preparation of future nurses for the job market.

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