Information and communication technology in nursing education
Tecnologia de informação e comunicação no ensino de enfermagem
Tecnologías de la información y la comunicación en la enseñanza de enfermería

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Abstract

Objective: To analyze the use of Information and Communication Technologies (ICTs) by nursing professors in the teaching and learning process.

Method: Qualitative study with an approach based on the Straussian Grounded Theory, conducted with nursing professors at public and private nursing schools in the Mid-west Region of Brazil. For data analysis, the steps were open coding – identification of codes; axial coding – determining subcategories and categories; selective coding – identifying a central category that represented the set of data analyzed.

Results: The open coding carried out with the answers from the 22 nursing professors, identified the codes: learning, clinic, association, continuing education, didactic, WhatsApp, Facebook and Youtube. The axial coding resulted in categories (fragility of lecturer training; use of social networks as a teaching method) and subcategories (knowledge; continuing qualification; tools) which represent the studied phenomenon. The selected coding refined all categories and subcategories, giving rise to the central category called "The challenge of involving the student in the teaching-learning process and the generation gap between lecturer and students".

Conclusion: It was possible to identify the use of ICTs through social networks (YouTube; Facebook and WhatsApp) as positive technological teaching strategies in nursing learning. However, for their implementation, it is necessary to overcome challenges related to pedagogical practice, students' access to technology and generational conflicts. These difficulties point to the need to discuss the education of the nurse lecturer and an academic organization aligned with the contemporary profile of the students, who are increasingly connected to technologies.

Resumo

Objetivo: Analisar a utilização de Tecnologias de Informação e Comunicação (TIC) no processo de ensino e aprendizado por docentes de enfermagem.

Métodos: Estudo qualitativo com abordagem na Teoria Fundamentada nos Dados Straussiana, realizado com professores enfermeiros em faculdades de enfermagem públicas e privadas do Centro-Oeste brasileiro. Para análise dos dados realizou-se codificação aberta - identificação de códigos; codificação axial - determinar as subcategorias e categorias; codificação seletiva - para constituir uma categoria central que representasse o conjunto de dados analisados.

Resultados: A codificação aberta realizada com a resposta dos 22 professores de enfermagem, identificou os códigos: aprendizagem, clínicas, associação, educação permanente, didática, WhatsApp, Facebook e Youtube. A codificação axial resultou em categorias (fragilidade da formação docente; utilização de mídias

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sociais como procedimento de ensino) e subcategorias (conhecimento; qualificação permanente; ferramentas) que representam o fenômeno estudado. A codificação seletiva refinou todas as categorias e subcategorias emergindo a categoria central nominada "O desafio de envolver o aluno no processo de ensino aprendizagem e a distância entre gerações professor-aluno".

Conclusão: Foi possível identificar o uso das TIC por meio das redes sociais (YouTube; Facebook e WhatsApp) como estratégias tecnológicas positivas no ensino de ensino aprendido da enfermagem. No entanto, sua implementação ainda precisa transpor desafios relacionados com prática pedagógica, condições de acesso dos estudantes à tecnologia e conflito de gerações. Essas dificuldades apontam para a necessidade de discutir a formação do enfermeiro educador e a organização acadêmica em consonância com o perfil discente contemporâneo, cada vez mais conectado às tecnologias.

Resumen

Objetivo: Analizar la utilización de tecnologías de la información y la comunicación (TIC) en el proceso de enseñanza y aprendizaje por parte de docentes de enfermería.

Métodos: Estudio cualitativo con enfoque en la teoría fundamentada en los datos de Strauss, realizado con profesores enfermeros en facultades de enfermería públicas y privadas de la región Centro-Oeste de Brasil. Para analizar los datos se realizó codificación abierta (identificación de códigos); codificación axial (determinar las subcategorías y categorías); codificación selectiva (para elaborar una categoría central que representara el conjunto de datos analizados).

Resultados: La codificación abierta realizada con la respuesta de los 22 profesores de enfermería identificó los códigos: aprendizaje, clínicas, asociación, educación permanente, didáctica, WhatsApp, Facebook y YouTube. La codificación axial dio como resultado categorías (fragilidad de la formación docente, utilización de medios de comunicación sociales como procedimiento de enseñanza) y subcategorías (conocimiento, cualificación permanente, herramientas) que representan el fenómeno estudiado. La codificación selectiva refinó todas las categorías y subcategorías y surgió la categoría central denominada "El desafío de involucrar al alumno en el proceso de enseñanza-aprendizaje y la distancia entre generaciones profesor-alumno".

Conclusión: Fue posible identificar el uso de las TIC por medio de las redes sociales (YouTube, Facebook y WhatsApp) como estrategias tecnológicas positivas en la enseñanza de la enseñanza-aprendizaje de enfermería. Sin embargo, para implementarse, aún es necesario superar desafíos relacionados con la práctica pedagógica, las condiciones de acceso de los estudiantes a la tecnología y el conflicto generacional. Estas dificultades señalan la necesidad de debatir sobre la formación del enfermero educador y la organización académica de acuerdo con el perfil actual de los estudiantes, cada vez más conectados a las tecnologías.

Introduction

The social importance of information and communication technologies (ICTs) requires updated teaching practices to support nursing knowledge and advancement. These technologies include technical means that allow information sharing and communicative processes, through resources such as computers, internet and social media.[1]

ICTs have become a common element in everyday life and have been included in the health sector[2]. In classrooms, ICTs can have a significant influence on the learning process.[3,4] In the area of nursing, ICTs can increase autonomy in the process of seeking knowledge, assist the apprehension of content,[5,6] support clinical decision making[2] and improve the quality of nursing care delivery.[7] In this sense, it is estimated that by 2025 the incorporation of ICTs will be an indispensable component in nursing curriculum and teaching practices.[8]

In contrast to the worldwide trend of nursing education,[8] it has been reported that nursing lecturers have low acceptance of ICTs and present limitations regarding its use, probably due to the physical, financial and technical structure of educational institutions.[9,10]

Teachers play a central role in the implementation of innovative teaching practices. However, a systematic review of the literature identified studies aimed only at identifying diseases and experiences of students using social networks for learning; studies on the application of ICTs from the perspective of the teaching practice were not found.[11]

Knowledge is an instrument of transformation. In this sense, empowerment is a consequence of the appropriation of knowledge and a preliminary step for the action of individuals.[12] This framework supports the idea that the use of ICTs, currently required in clinical nursing practice, presupposes that knowledge and skills about them were acquired during training, with the teacher as the mediator of this process.[8]

The experience of lecturers with the use of ICTs can show if the dynamics of the classroom are favorable to the development of technological skills in nursing students. Thus, this study aimed to analyze the experience of nursing lecturers with the use of ICTs in the teaching and learning process.

Methods

Qualitative study using the Straussian Grounded Theory (SGT) approach. The SGT allows dealing with experiences and realities of the participants in

an interpretative and systematic manner. The paradigmatic model of verification of this theory comprises analysis and organization of data to interpret each listed category/subcategory, providing accurate results in relation to the reality studied.[13] Thus, the SGT was adopted in this research to: 1) construct a chart with categories and subcategories which must be considered to understand the dynamics of the use of ICTs in nursing education; 2) identify the central category, also called theoretical generalization.

Intentional sampling was used to select participants in six public and private Higher Education Institutions (HEIs) in a capital in the Mid-West Region of Brazil, from August to November 2015. Participants were nursing professors who were permanent staff in HEIs recognized by the Brazilian Ministry of Education and with more than five years of operation. Lecturers who were away from their activities for any reason during the data collection period were excluded. After the initial intentional sampling, selection of participants continued until reaching data saturation.[13]

Data collection was carried out by the first author of this study and involved visiting the coordination of the nursing course of each HEI and requesting authorization for the study. At this meeting, the coordination provided the name and telephone number of the lecturers who met the inclusion criteria of the study. Then, these lecturers were contacted by telephone, informed about the research objectives and invited to participate in the study. Those who accepted scheduled a meeting for the interview according to their possibilities.

After reading and signing the Informed Consent Form, the interviews were conducted by the first author of the study, in a single meeting with each participant, and in an environment free of noise and interruptions, in the HEI itself. The interview was conducted based on the guiding question "What is your experience with the use of Information and Communication Technologies in the pedagogical context of your classes?". After that, the first author asked, "Is there anything you would like to add about your teaching practices and the use of ICTs?". All interviews were digitally recorded.

The interviews were transcribed by the interviewer shortly after their completion.

Data analysis

After the transcriptions, the interviews were submitted to analysis and interpretation according to the Grounded Theory method, strategically divided into three levels.[13]

The analysis in the first level is based on the thorough reading of the interviews, called open coding. In this stage, the codes (words or expressions) that were more prevalent in the participants' speeches were identified.[13] These codes were then registered in the Atlas/ti software.

The second level analysis, called axial coding, occurs by grouping codes by similarity and/or proximity, giving rise to subcategories with common units of meaning. Subsequently, these subcategories are grouped for the construction of categories.[13]

Finally, in the third level of analysis, defined as selective coding, the categories were refined, integrated and interrelated to make up a central category that represented the set of data analyzed. This analysis uses inductive identification and hierarchy of categories based on the objectives of the study, resulting in a thematic axis or emerging theory, that is confirmed and validated by revisiting the database to verify the representativeness of the theory in relation to the data collected.[13] The analysis and interpretation of the content transcribed is illustrated in figure 1.[13]

Data interpretation

Data interpretation has an important role in SGT as a systematic process.[14] The first author, who conducted all the interviews and was the main responsible for data interpretation, has a degree in nursing and group management, is a nursing professor and has worked as coordinator of a nursing course for 10 years in the Mid-west Region of Brazil. In addition, the first author has been studying SGT and pedagogical practices for a long time, and has defended a master's thesis and written articles on this theme. All other authors have experience in qualitative data analysis and agree with Strauss' epistemo-
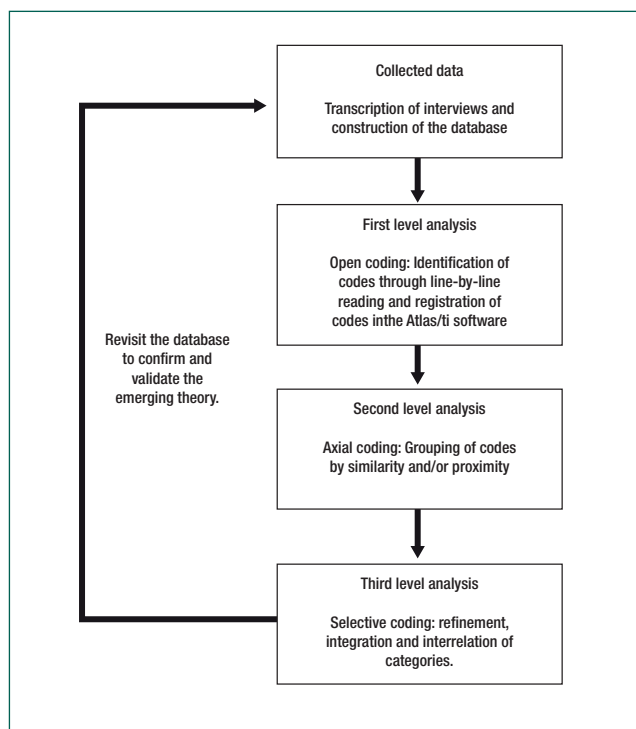
Figure 1. Flowchart of the analysis and interpretation of the interviews of nursing professors on the pedagogical use of information and communication technologies, based on the Straussian Grounded Theory.

logical perspective. These experiences were reflected in the data analysis of this study.

Ethical aspects

This study followed the guidelines for research on human beings in Brazil, obtaining the informed consent of all participants and approval from the Research Ethics Committee, protocol #1,314,801.

Results

Twenty-two lecturers participated in the study. Participants were mainly women (19 - 86%), were over 45 years old (12 - 46%), had more than 15 years in the profession (11 - 50%), had a Master's degree (9 - 42%), were linked to the private school system (18 - 82%) and had a work schedule of 20 hours per week (16 - 74%).

Open coding revealed the codes: learning, clinic, association, continuing education, didactic, WhatsApp, Facebook and Youtube. Axial coding resulted in categories (Fragility of lecturer training;

Use of social networks as a teaching method) and subcategories (Knowledge; Continuing qualification; Tools), which represent the studied phenomenon. Therefore, it was possible to infer that, in the perception of the professors interviewed, knowledge was considered the basis of support for the use of ICTs (Facebook, Youtube, Whatsapp).

It is worth noting that lecturers associated ICTs with learning and recognized continuing education as an important factor for improving pedagogical practices. Lack of practice using digital tools was pointed out as a limitation for didactic practices.

The speeches of the participants showed that the fragility of lecturer training in relation to pedagogical practices affects the use of social networks as a teaching method. Participants pointed out that the weak points in the use of technology emerge from factors related to the students, the educational institution and the lecturer. In this context, it is possible to highlight the difficulties experienced by students when accessing technological resources outside the classroom and the lack of ability of teachers to deal with technology and to associate it with the content of the subjects.

Selective coding refined all categories and subcategories, giving rise to the central category called "The challenge of involving the student in the teaching-learning process and the generation gap between teachers and students". This category allowed integrating all the other categories and subcategories without semantic impairment (Chart 1).

Discussion

In this study, the use of ICTs as educational resources for nursing teaching is done through social networks (YouTube; Facebook and WhatsApp). However, despite pointing out these resources, the lecturers highlighted the challenge of involving the students in the teaching-learning process and the generation gap between teachers and students as factors that hindered the use of ICTs in the classroom. Another aspect pointed out by the participants was lack of knowledge about the use of ICTs during their lecturer training, highlighting

Chart 1. Distribution of representative statements that originated the categories, subcategories and codes of the research with nursing professors on the difficulties in the use of information technology in the teaching process.

	Categories	Subcategories	Codes	Representative statements
Selective coding: The challenge of involving the student in the teaching-learning process and the generation gap between teachers and students	Fragility of lecturer training	Knowledge	Learning	The difficulty of technology... You see, it depends a lot on the student's knowledge and experience. We have students who have more access to technology, and we have students with almost no access to this technology, you know? And when I, as a lecturer, see this difficulty in the student, it is something that I will be working on, I **teach the student to develop this practice**. (P1) This is a challenging moment for the lecturer, because today we work with Generation Y, a generation that is plugged and tuned into several windows. **I think about what I use during the dialogic process...** Sometimes, you seek information quickly and the student is inattentive, and you ask a question... The challenge is to seek, at that moment, the evidence you are discussing. (P19)
			Clinic	The use of cell phones and technology can hinder pedagogical practice. A lot, actually! The first thing I ask when going to **hospital practice** is to keep cell phones off. (P11)
			Association	In this case, it (information and communication technology) could **be complementary** for the implementation and teaching of a topic. (P18) So, I think we have to develop information technology, the student is working on a certain subject all the time. And the student is constantly researching on his cell phone to see if what we say is correct. So, we have to use technology in our favor in the classroom, of course I allow the students to use their cell phone or tablet, but I have to have control if they are using it for **something related to the classroom context** or not. (P17)
		Continuing qualification	Continuing education	We urgently need to have **teaching workshops** where we can equip ourselves to use these new technologies better. (P18) A difficulty we often have is the motivation of the worker... to **adapt** to new methodologies and working methods. (P15) Today, to work with teaching we need **continuing training**. Mainly of the lecturer, by the way. You always have to be up to date. (P11)

	Categories	Subcategories	Codes	Representative statements
Selective coding: The challenge of involving the student in the teaching-learning process and the generation gap between teachers and students	Fragility of lecturer training	Continuing qualification	Didactic	[...] they arrive prepared and we lack **knowledge on how to better use technology for teaching**. (P18)
	Use of social networks as a teaching method	Tools	WhatsApp	I don't think **WhatsApp** has to be part of the **classroom context**. Because I see that the training process is composed of different processes. (P17) For me, this is fabulous! But we need to **know how to use** this correctly, [...] because it's not cool to look at **WhatsApp** every 10 minutes! (P16) [...] social networks are more interesting than the informal network of the Moodle platform. **WhatsApp** groups**... Orientations** in smaller groups have also been occurring. pequenos grupos também têm acontecido. So, today, these new technologies can help a lot! (P21) [...] this **WhatsApp** thing... it **disturbs** the lecturer! (P22) [...] we have a **WhatsApp** group [...] and it can **make it easier or harder**. So, I show the student that if he spends a lot of time on his cell phone, he will waste his time just answering to groups!... He will lose interesting things. He could be reading articles, studying, taking texts from the library or consulting other books... (P15)
			Facebook	**We have been using it**... It has been an ally, because, initially, the university offers the Moodle platform. Then we realized that people didn't access it and didn't advance. So, we decided to create a closed group on **Facebook** and abolish Moodle for one semester. And we realized that even the most difficult activity, when it is on **Facebook**, they like it [laughs]! The use of the social network, like Facebook, has been very interesting for us! (P21)
			Youtube	[...] So we realized that it is more dynamic to use information and communication technologies and show bad and good information. We will have a class this week on important topics for health policies and **a student sent me what he found on Youtube**... (P17)

the need for continuing qualification for the use of technologies.

Technology is a relevant tool for making students active in their learning process, as it enables methodological diversity and student-centered education. The empowerment of future nursing professionals for the use of technologies in their professional activities and their continuous training requires an understanding that the lecturer is their guide in this process.[20] Thus, it is impossible to think about the effective use of ICTs without considering its integration in the curriculum of students and lecturers.

Facebook is the social network that leads the ranking of ICTs used in nursing care, research and teaching, followed by Twitter and Whatsapp.[11,15] In this study, we also identified the promising use of YouTube, a public platform for videos on different topics that can be an extra teaching tool. The use of ICTs to approach the curricular content to the student's reality favors a critical, reflective and generalist education. However, there is resistance to the use of diversified strategies that combine online tools with the contents taught.[16]

Nursing activity is intertwined with education, either in the context of care, in health education activities, or in the training of the nursing team members in educational institutions and continuing education programs. For this reason, this aspect has been confused with an innate competence, and this assumption leads to the erroneous perception

that nurses do not need to be trained in pedagogical practices.[17]

In this context, the expansion of the use of ICTs is linked to the ability to apply them in the teaching process.[18] However, the effective integration of ICTs into the curriculum also involves previous experiences with the use of technology in teaching, educational policies and the development of pedagogical technological knowledge. The latter involves the synergy between the content proposed in the pedagogical project, teaching-learning methodologies and digital resources.[19] These data may explain why, in our study, lecturers who reported difficulties in the use of ICTs also stated that they needed training and institutional support to be able to use them.

The consequences of the restricted training of nurses in pedagogical skills can be perceived in the resistance and difficulty of the lecturer to implement methodologies that are different from the teacher-centered practices. This fact can restrict the tools used in the teaching process, including the ICTs.[21]

Educational institutions have invested in the use of virtual platforms, which allow teacher-student interaction. However, it has been perceived that the use of these platforms has been limited to sharing materials, which is very far from innovative educational practices. This can compromise hybrid and distance education.[9] Distance education, in particular, has grown in recent years and represents a possibility of democratization and inclusion, due to its flexibility of access, cost and time. However, tools for evaluating the quality of teaching are still scarce and the topics that can be taught in this modality are still undefined in practical professions, such as nursing.[22]

It is necessary to ensure that content, resources and technical support are not barriers to the use of ICTs as teaching methods.[23] It is estimated that only few people do not have access to the internet, cell phone and computer in different countries of the world. Nevertheless, these people, who generally have a lower income than others, must also be considered when planning the use of ICTs in education.[24] The experiences of the lecturers interviewed

in our study showed that this is a challenge for lecturers in the classrooms: combining innovation and an inclusive perspective in the teaching process.

In addition to the issue of access to technology, another obstacle to the use of ICTs is the generation gap between lecturers and students. This is because the health area can be composed of three generations, called X, Y and Z. Generation X includes people born between 1962 and 1980; those born between 1981 and 1989 are called Generation Y; and those born after 2000 are Generation Z.[25] Therefore, generational conflicts may have been a common dilemma in the practice of the teachers interviewed in our study, since almost half of them were 45 years old or older (that is, belonging to generation X). Undergraduate students, on the other hand, have been entering higher education at an increasingly younger age.

For generation X, the use of ICTs includes disadvantage and expected limitations, as the younger generations already start their training in the context of ICTs. Thus, the technological advance requires continuing qualification to minimize the feeling of helplessness of these lecturers and the generational conflict in pedagogical practice.[26]

The complexity of working with ICTs in health should be frequently discussed from the perspective of new forms of learning that emerge from educational processes, which aim to train professionals committed to quality and to develop a professional practice with carefulness and competence. Therefore, significant changes must be constant in teaching and are not dissociated from the generation to which the lecturer belongs.[26,27]

Conclusion

In this study, the use of ICTs in the teaching and learning process in nursing occurred through social networks (YouTube; Facebook and WhatsApp). However, despite of their use, lecturers reported that their knowledge in handling these technologies affects their use as a teaching method. And, this difficulty is more accentuated

as the age/generation gap between students and lecturers increases. The results of this study have potential benefits in three distinct areas: in teaching, it allows a reflection on teacher education, with the objective of aligning the pedagogical practice and the increasingly technological profile of academics, supporting the advancement of nursing courses and overcoming barriers to the use of ICTs in the theoretical-practical field. In research, it provides knowledge on the difficulties in the use of ICTs and encourages new studies in the area to depict the present and the future of teaching. In the health system, the use of ICTs can favor the training of critical professionals that are connected to the needs of the population, improving the quality of care.

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Collaborations

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