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Improvement of didactic-pedagogical practices in a higher radiology technology degree course

Melhoria das práticas didático-pedagógicas em um curso superior de radiologia

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ABSTRACT:

The article identifies the best pedagogical didactic practices for a radiology technology degree course. Data were collected based on semi-structured interviews. The obtained results are discussed by means of a participatory process and selected by the most relevant pedagogical practices, according to the following categories: objectives, contents, Methodology and evaluation. The conclusions indicate that the collective reflection among the participants of the study is essential to align pedagogical practices to the labor market.

Keywords: Knowledge management; Technology in Radiology; Health Knowledge, Attitudes, Practice.

RESUMO:

O artigo identifica as melhores práticas didático-pedagógicas para um curso superior de Tecnologia em Radiologia. Os dados foram coletados com base em entrevistas semiestruturadas. Os resultados obtidos foram discutidos por meio de um processo participativo e foram selecionados os conceitos e práticas pedagógicas mais relevantes, de acordo com as seguintes categorias: objetivos, conteúdos, metodologia e avaliação. As conclusões indicam que a reflexão coletiva entre os atores do estudo é essencial no alinhamento das práticas pedagógicas ao mercado de trabalho.

Palavras chiave: Gestão do conhecimento; Tecnologia em Radiologia; Conhecimentos, Atitudes e Prática em Saúde.

1. Introduction

Innovations in the health environment and the way of working in teams are contemporary challenges facing health professional education (Weinstein, Dolce, Koster, Parikh, Hamlyn, McNamara and DiVall, 2017). Health professionals should be prepared with skills for real needs of the job market to be able to act safely in this changing environment.

In this context, the educational organizations has been responsible for development the students who will be the future professionals. Therefore, the priority of these organizations should be to evaluate and update their teaching practices, so that knowledge will not be limited to traditional practices, but rather a sharing of knowledge between the organizations that employ their professionals and the educational institution. It is also worth observing that higher education institutions play an important role in the economic development of countries and, therefore, must implement strategies to improve their educational services. The learning process should imply on knowing how to seek knowledge, reflect and create a critical view so that the student is able to understand their social reality. Priddis and Rogers (2017) believe that the higher education sector should play a central role in preparing societies for new times by reflective practice through a deliberate process to encourage continuous learning.

According to Brandt (2014), learning is directly related to the ability of managing knowledge. Thus, the knowledge has been recognized as one of the most important resources of an institution, making possible smart actions at the organizational and individual levels. Knowledge management is the field that studies how organizations understand what they know, what they need to know, and how they can make the most of knowledge (Biloslavo and Trnavčevič, 2007). Therefore, it offers a set of practices that help organizations to identify, create, store, share and use the knowledge.

This study is the result of a research project that aims to improve the didactic-pedagogical practices of the radiology technology degree course. The project received financial support from the Federal Institute of Santa Catarina. A qualitative research was carried out with those graduates in radiology technology degree course who work in the field and some of their managers. The data were analyzed through the Bardin technique of content analysis (1977).

The empirical contribution of the study is related to the identification of didactic-pedagogical practices that can be used by other teaching organizations to facilitate the difficulties found in the teaching-learning process.

2. Methodology

This is a descriptive qualitative research. The study population was formed by students graduated from radiology technology degree course, formed in the last 10 years who work in the area, and their managers.

This is a non-probabilistic sample since it was selected based on intentional selection criteria used for the purpose of determining the units of the population that are part of the sample. The works were developed basically in two main stages: pre-field and post-field:

In the pre-field stage: a literature review was carried out by means of a bibliographical research, aiming to understand the subject of study and to create a script with questions to be applied in the stage of semi-structured interviews.

In the post-field stage, the collected data were analyzed. The following six steps pursue the knowledge management strategies proposed by Nonaka and Takeuchi (1997) to increase knowledge and were carried out from the data collected in field research.

> 1) Identify the current knowledge: characterization of the knowledge of the professionals of the radiological techniques through semi-structured interviews with the professionals inserted in the radiology organizations;
>
> 2) Identify the desired knowledge: identification of gaps in the knowledge base of these professionals through semi-structured interviews with the heads of the multidisciplinary teams where the radiology techniques professionals characterized in the previous stage

work.

3) To store the knowledge: data compilation, transcription and analysis of the interviews through the thematic analysis technique, which is configured as a form of content analysis used to identify, analyze and expose patterns in the collected data (Braun and Clarke, 2006).

4) Share the knowledge: in this post-field stage, the identified knowledge was shared with the professors of the radiology technology degree course. practical procedures were simulated during class to delineate students' difficulties. In the sequence, didactic-pedagogical practices were proposed to mitigate the identified gaps through the sharing of knowledge (practical activities with students during class).

5) Create knowledge: the data derived from the previous stage were organized, analyzed and proposals were made to improve didactic-pedagogical practices.

6) Apply knowledge: the didactic-pedagogical practices identified through the project for the improvement of radiology technology degree course were applied by some teachers with the involvement of the students, aiming to make the learning process more collaborative.

All organizations that participated in the research are partner organizations of the Federal Institute of Santa Catarina (IFSC). In order to maintain the confidentiality of collected data in a way that does not identify individuals or organizations, corresponding codes have been created (E1-interviewed 1 or G3 - Manager 3).

3. Results

At this point, the profile of the respondents was characterized, as well as their descriptive measures. In total there are 64 technologists with address in Florianópolis registered in the National Council of Technicians in Radiology (CONTER). Of these, 32 students graduated from the Radiology Technology Degree Course offered by IFSC, and are working in the field in Florianópolis.

Initially in the pre-field phase, the study involved the characterization of the professionals' knowledge of the radiological techniques, which implies in the necessary proficiency profile to develop the activity. According to CONTER Resolution No. 10/2015, the duties, competencies and functions of the radiology technologist professional are: a) to analyze image quality; b) administer and handle contrast, pharmacological and radioactive substances under the supervision of the competent professional; c) issue a technical opinion; d) express an opinion and suggest the application of radiological techniques appropriate to the case under discussion; e) guide the patient and caregivers when performing radiological exams and procedures.

The regulation in reference also added to art. 19 of the aforementioned Resolution, the following items: VII - conduct radiometric survey; VIII - provide advice; IX - to act as Technical Manager in companies with commercial activities in the field of radiological and related equipment (CONTER Resolution No. 10, dated 07.07.2015 - DOU dated 20.07.2015).

According to the interviewees, the radiology technologist has knowledge in several areas of radiology, which allows a great number of job opportunities in areas such as Conventional Radiology, Radiotherapy, Nuclear Medicine, MRI, Mammography, Computed Tomography, Bone Densitometry, Application of digital radiology companies, among others. However, the most striking characteristics commented by the interviewees were a solid training in the anatomy, physics and management inherent to the professional technologist in radiology.

The second step was to identify the gaps in the knowledge base of radiology technologists that occurred through the analysis of the different perceptions of these professionals, regarding the need to acquire and improve their skills for daily practice, followed by the third step that was the compilation of the data into units of analysis.

> "More imaging should be worked out in all areas, X-rays, tomography, and resonance. This should not only be worked on in the discipline of Imaging, but in most disciplines, teachers could bring images to the classes and work on it."E4
>
> "The practical part that involves dentistry I had very little and it is a field that I still do not see working technologists, I have no practical knowledge of this part." E5
>
> "I'm missing a more knowledge oriented to the pathologies and their identification in the images". E8
>
> "The management part, involving the focus of human resources, leadership, how to manage a group of people, schedules, how to deal with unforeseen workplace." E10
>
> "I lack the content of legislation related to professionals in radiological techniques, to seek the space that the category needs, besides space in the job market" E13.

In general, five units of analysis were identified in relation to knowledge gaps according to the interviews, they are: a) imaging; b) dental practices in radiology; c) pathology; d) administration and; e) legislation. It should be noted in relation to this knowledge that the pedagogical project of the course was changed in 2016, so that several of these needs are best worked out in the course practices.

Regarding the interview with some of the radiology managers, they acknowledged that the radiology technologist trained at the Federal Institute of Santa Catarina (IFSC) is differentiated. They identified characteristics as: motivation, education and willingness to learn. When questioned about the knowledge gaps of these professionals stands out one of the lines:

> "It is clear that some aspects only a long time of practice allows you to improve, but there are no deficiencies that I identify in the staff of the IFSC who works here, besides it is clear their concern with the radiological protection of patients." G3

The aspect indicated by the manager reflects the concern of the radiology technology degree course with aspects related to radiological protection of the patient, as the use of personal protective equipment (PPE). Students practice using these PPE during practical classes of radiological techniques, allowing it to be natural to offer this type of protection to patients.

In the fourth stage, the identified knowledge was shared with the professors of the radiology technology degree course. The fifth stage (creating knowledge) involved the proposition of didactic-pedagogical practices focused on the identified demand. The sixth stage included the application of the generated knowledge, where some practices were applied by some teachers of the course involving the students with the intention of making the learning process more collaborative.

Practical procedures were simulated during class to improve students' knowledge, so they could train examinations such as intraoral x-rays, practical procedures were simulated during class to improve students' knowledge, so they could train examinations such as intraoral x-rays, guided by a dentist teacher.

The students of the 2016 class of radiology technology degree course, who were studying the dental radiology discipline, were able to practice in their peers several procedures. The possibility of studying the theory and practicing the learned content facilitates the understanding of the students and makes the subject more interesting according to the students' testimonials.

Table 1 presents the pedagogical didactic practices. They presents a reflection between the collected data and the theory of learning.

Table 1
Proposed practices

Gap of identified knowledge	Proposed practices
Imaging	Structural identification and peer review in Imaios software
Dental practices	Scheduled instruction
Pathology	Discussion with argumentation, analysis of directed images, lessons learned
Administration	Management simulation in radiology through games, case studies, problem proposition
Legislation	Storytelling, lectures with council representatives

Students' ability to search, evaluate, and select enables learning. Some practices such as those identified in this research help students to identify complications and propose solutions to real problems. With regard to the teaching of Radiology, they must also put into practice concepts, procedures and attitudes developed during classes, accepting that often the students knows a lot about a certain theory and have perceptive arguments about situations acquired with practical classes. However, may lack a conceptual network that unifies to all the fragments of information that they possesses. As progress in their studies, they move from perceptual to conceptual arguments, realizing concrete reasoning and analogies, through their interaction with the world and the people with whom they have contact.

Recognizing that the process of understanding concepts is gradual and always requires the students' efforts, and for the improvement of knowledge occurs whenever a new contact with the concept appears, we understand that, for the student to learn a certain concept, he must relate it to the prior knowledge it possesses. Meaningful learning lies in the assimilation of theoretical knowledge with practices that allow the learner to put his or her skills into action and learn by doing

The teacher should assist in the task of formulating and reformulating concepts by activating the prior knowledge of the students through practices that articulate this knowledge to the new information being presented.

In this sense, the identified practices are an important resource to assist the student in the development of problem solving skills.

4. Conclusions

This research showed that educational institutions, in general, and courses in particular, have the potential and instruments capable of contributing to the development of the society in which they are inserted. It is the role of teachers to define content, strategies, evaluation process and practices that are consistent with the reality that the student will find in the job market. The diagnosis of knowledge about its current practices is part of an ongoing process of improvement that involves finding solutions to problems and difficulties.

An effective learning process involves the relationship between the knowledge acquired in the classroom and the use of this knowledge in practices that encourage the student to solve problems, reflect on the variables of the context in question and create a critical sense capable of looking for innovative answers. In conclusion, the continuing education of graduated professionals is the best way to eliminate knowledge gaps, and some didactic-pedagogical practices can facilitate and motivate learning.

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