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ORIGINAL ARTICLE

CREATION OF A VIRTUAL LEARNING ENVIRONMENT IN INTENSIVE CARE

CRIAÇÃO DE UM AMBIENTE VIRTUAL DE APRENDIZAGEM EM TERAPIA INTENSIVA

CREACIÓN DE UN AMBIENTE VIRTUAL DE APRENDIZAJE EN TERAPIA INTENSIVA

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ABSTRACT

Objective: to create a virtual learning environment (VLE) for continuing education in Intensive Care Units. ***Method:*** this is a mixed, descriptive, cross-sectional study developed at the Intensive Care Unit of a Hospital de Ensino de Porte Especial, with 70 professionals who make up the Nursing team. A personalized questionnaire was used and adapted according to the characteristics of the Instructional Design methodology. Data were analyzed using Descriptive and Inferential Statistics methods and presented the results in a table. ***Results:*** the virtual learning environment was confirmed as an important tool for continuing education. ***Conclusion:*** it was possible, through the results, to infer that the construction of knowledge can be increased by the union of teaching strategies that allow the professional autonomy, the dialogical relationship and the deepening of the contents. It was verified that the development and implementation of a tool for continuing education stimulates the discussion of specific topics and debates in the forum, as a means to promote the evolution of scientific knowledge by the team involved. ***Descriptors:*** Technology Development; Information and Communication Technology Project; Continuing Education; Intensive Care Units; Patient safety; Nursing.

RESUMO

***Objetivo*:** criar um ambiente virtual de aprendizagem (AVA) para a educação continuada em Unidades de Terapia Intensiva. ***Método*:** trata-se de um estudo misto, descritivo, transversal, desenvolvido na Unidade de Terapia Intensiva de um Hospital de Ensino de Porte Especial, com os 70 profissionais que compõem a equipe de Enfermagem. Utilizou-se um questionário personalizado e adaptado segundo as características da metodologia do *Design Instrucional*. Realizou-se a análise dos dados, utilizando métodos de Estatísticas Descritiva e Inferencial e apresentaram-os resultados em tabela. ***Resultados*:** confirmou-se o ambiente virtual de aprendizado como uma ferramenta importante para a realização da educação continuada. ***Conclusão*:** permitiu-se, pelos resultados, inferir que a construção do conhecimento pode ser incrementada pela união de estratégias de ensino que permitam a autonomia do profissional, a relação dialógica e o aprofundamento dos conteúdos. Comprovaram-se que o desenvolvimento e a implantação de uma ferramenta para a educação continuada estimula a discussão de temas específicos e o debates em fórum, como meio de promover a evolução dos conhecimentos científicos por parte da equipe envolvida. ***Descritores*:** Desenvolvimento de Tecnologias; Projeto de Tecnologias de Informação e Comunicação; Educação Continuada; Unidades de Terapia Intensiva; Segurança do Paciente; Enfermagem.

RESUMEN

Objetivo: crear un entorno virtual de aprendizaje (AVA) para la educación continuada en Unidades de Terapia Intensiva. ***Método:*** se trata de un estudio mixto, descriptivo, transversal, desarrollado en la Unidad de Terapia Intensiva de un Hospital de Enseñanza de Porte Especial, con los 70 profesionales que componen el equipo de Enfermería. Se utilizó un cuestionario personalizado y adaptado según las características de la metodología del Diseño Instruccional. Se realizó el análisis de los datos, utilizando métodos de Estadísticas Descriptiva e Inferencial y presentaron resultados en tabla. ***Resultados:*** se confirmó el ambiente virtual de aprendizaje como una herramienta importante para la realización de la educación continuada. ***Conclusión:*** se permitió, por los resultados, inferir que la construcción del conocimiento puede ser incrementada por la unión de estrategias de enseñanza que permitan la autonomía del profesional, la relación dialógica y la profundización de los contenidos. Se comprobó que el desarrollo y la implantación de una herramienta para la educación continuada estimula la discusión de temas específicos y el debate en foro, como medio de promover la evolución de los conocimientos científicos por parte del equipo involucrado. ***Descriptores***: Desarrollo Tecnológico; Proyectos de Tecnologías de Información y Comunicación; Educación Continuada; Unidades de Cuidados Intensivos; Suguridad del Paciente; Enfermería.

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INTRODUCTION

the intense pace of the globalized world and the increasing complexity of tasks involving information and technology that make professionals need to be continuously updated to the competitive world of work is kept in mind.[1] It became the most dynamic learning concept because of these great changes in the age of technology, making "learning" no longer a sealed process.[2] It is noticed that, increasingly, the social and work world needs subjects who know how to live and produce collectively. It is the modality of communication in the virtual learning environment that is a decisive factor for the change of the communication and educational paradigm. As a consequence, through collective intelligence, the network curriculum and the formation of cooperative networks, the production of a new social ecology, and a path towards the knowledge society.[3]

There is now the opportunity to develop an environment with the technical possibility of intertwining culture, social practice, knowledge, pedagogical practice and science, expressing itself through different languages in an attempt to produce new meanings and, as a consequence, a new educational landscape.[4] It is known that the creation of a web-based educational system consists not only in the digitization of texts or printed materials, but in providing its own language, principles, tools and methods, which makes the virtual learning environment (VLE) a space dynamic and interactive, current, closer to the reality of the user and extremely rich, as it allows the use of different media resources that make the teaching-learning process more creative, interesting and powerful.[5] By incorporating such technologies into the educational program, it is intended that the professional be able to learn and build new knowledge.[6]

It presents the application of virtual learning environments in a coherent and responsible way, which proves to be an efficient way to build knowledge, foster autonomy, develop skills, improve speech and argumentative capacity and work together with other participants, besides representing excellent opportunity of professional qualification.[5] It can help, therefore, the management of units dependent on human resources. Over the last decades, it has been observed in several countries, a mobilization of quality programs in hospital organizations with the objective of increasing their management and improving the efficiency of these services.[7]

There is a management system used by the Intensive Care Units systematized and that is careful with fundamentals, such as the valorization of human resources, strategic vision, customer-centered quality, focus on results, senior management commitment , the vision of the future, the valuation of people, proactive action and continuous learning.[8] It is known that it is the job of nurses to manage their team and, in order for them to conduct this managerial process competently, knowledge, skills and attitudes are required to enable them to pursue cooperation strategies and be able to face changes in order to Nursing care and ensure quality service to clients.[9]

It is stated that, regarding the technical aspects of the activity of the ICU manager, there is a guideline for other professionals working in the area, a preparation/disclosure of clinical, diagnostic and therapeutic guidelines, periodic analysis of the results obtained (mortality, high , complications, hospital infection), among others.[10] It is possible, based on the VLE's functionalities, to use them in the management of hospital units, assuming premises, managing activities and materials, organizing training, improving communication, evaluating the professional performance, storing and making available updated contents.[11]

It is important to note the importance of continuing education in ICU, the shortage in the implementation of continuing education programs in intensive care units, and the success of educational actions, it was mentioned the need for the participation of staff, educators, institutions, political, social and economic means.[12] From this reality, the need to implement educational programs is emphasized, since the ICU, because it is a highly complex sector, requires continuous training from the professionals, and the programs are necessary for a quality of assistance adequate to the needs of user.[13]

It is understood that it is possible to develop activities that qualify health practices within the institutions themselves, because, in these places, there is a wealth of knowledge that can be converged for the growth of all, reflected in the global health care.

OBJECTIVE

- To create a virtual learning environment for continuing education in an Intensive Care Unit.

METHOD

This is a mixed, descriptive, cross-sectional study developed at the Intensive Care Unit of a Teaching Hospital of Porte Especial. Transcription and data analysis were used through questionnaires and describing the stages of development and deployment of the virtual learning environment.

The study was carried out in an Intensive Care Unit (ICU) of a special-education hospital in the interior of São Paulo. It is reported that this ICU has 23 beds, attending, preferably, additional health patients with various diseases, being both clinical and surgical. The human resources table of the unit related to the Nursing team is composed by 60 Nursing technicians and ten nurses, one of them being the unit supervisor. This unit includes a multidisciplinary team, being intensivist physicians, physiotherapists, administrative assistants, hygiene and cleaning services and psychologists, in addition to the support services of social workers, pharmacists and occupational therapy.

As inclusion criteria, all the professionals who make up the Nursing team of the Intensive Care Unit (7th floor - agreement) were prioritized, being Nursing technicians and nurses, regardless of the work shift. It is reported that 70 professionals took part in the research, being 60 nursing technicians and 10 nurses. Exclusion criteria were those professionals who stayed away from the unit due to licensing reasons, a vacation period of more than 15 days and unjustified absences in the period in which they were using VLE and/or did not participate in 75% of proposed activities.

The doubts of the ICU Nursing team that accepted to participate in the study were clarified after the presentation of the study, and the agreement was signed by signing the Free and Informed Consent Term (FICT), with the inclusion of the signatures of the participants, of the researcher and advisor.

The evaluation questionnaires were given to the technicians and nurses of the unit in the VLE pre-participation period and, after termination (summative evaluation) of VLE development, the questionnaires remained anonymous. The period of use of the VLE was determined as three consecutive months, from July to September, 2017.

A personalized questionnaire was used and adapted according to the characteristics of the Instructional Design methodology for self-assessment, evaluation of learning and management of the activities developed.[14] After completing the questionnaires, data analyzes were performed using Descriptive and Inferential Statistics methods, analyzing questions of population probability based on the sample data.

The project was approved after approval by the Research Ethics Committee of the Medical School of São José do Rio Preto, São Paulo, under Opinion No. 2104808.

The development of content, activities and evaluation of VLE was delineated through the application of the concepts of the methodology of Instructional Design from the ADDIE model and its Portuguese translation for Analysis, Design, Development, Implementation and Evaluation. Effectiveness in the presentation of the content, ease of understanding of the material, adhesion and motivation of the professionals to the presented problem were sought, by the model, as well as the evaluation of improvements in each step.

The four phases of the ADDIE proposal were described:[15] Analysis - identification and characterization of the target audience; verification of learning needs; delimitation and distribution of the content in the hourly load; bibliographic reference; technological tools; applications and virtual learning environment; production team (content managers, graphic designer, tutor and support technicians); Design: content planning and organization, in a detailed way, in modules with the mapping of learning objectives; pedagogical mediation; definition of strategies to achieve the objectives; media selection; appropriate tools; description of the materials to be produced for the use of the nurses and manager; Development - production and adaptation of resources and digital didactic materials in specific media; structuring and organization of activities in the tools for content evaluation; definition of the parameters of the virtual environments and preparation of pedagogical, technological and administrative supports; Implementation - application of the Instructional Design proposal with the publication and availability of content to professionals; configuration of virtual learning tools and environments; Evaluation - considerations about the effectiveness of the proposed solution, both of the educational solution, as well as improvement in communication and management of the unit and revision of the strategies implemented. Thus, through evaluation, revision and validation, the entire proposal in all products resulting from each phase of Instructional Design must be analyzed.

In order to make study time flexible and facilitate the educational experience of professionals, all study material in the virtual learning environment that can be accessed in different devices connected to the Internet, whether mobile (tablet, smartphone and notebook) or no (desktop computer).

RESULTS

Data was collected from a sample of 60 records. The data were divided according to the following variables: function, age, sex, work shift, training time (months), working time in the institution and a multiple choice questionnaire directed to the evaluation of the virtual learning environment.

Descriptive statistics methods were used to analyze the probabilities of the population, based on the sample data. The following methods were used for a better understanding: average, median, mode, standard deviation, maximum value, minimum value, multiple linear regression and standard error.

After the data tabulation, the functions of descriptive statistical analysis were performed. The profile of the studied sample was described in a descriptive way, considering the variables and their unfolding (Table 1).

Table 1. Sociodemographic profile of the sample. São José do Rio Preto (SP), Brazil, 2018.

	Records (N)	Proportion (%)
Function		
Nurse	9	12.86
Nursing technician	51	72.86
License	3	4.29
Not filled in	4	5.71
Others	3	4.29
Age		
20 to 30 years	16	26.67
31 to 40 years	29	48.33
41 to 50 years	9	15.00
> 50 years	6	10.00
Sex		
Female	47	78.33
Male	13	21.67
Work shift		
Morning	9	15.00
Afternoon	16	26.67
Night	35	58.33
Time of training (Months)		
Up to 60 months	10	16.67
61 to 120 months	20	33.33
121 to 180 months	15	25.00
181 to 240 months	12	20.00
241 to 300 months	1	1.67
301 to 360 months	1	1.67
> 360 months	1	1.67
Time Working at the Institution (Months)		
Up to 24 months	14	23.33
25 to 48 months	8	13.33
49 to 72 months	10	16.67
73 to 96 months	8	13.33
97 to 120 months	7	11.67
121 to 144 months	1	1.67
> 144 months	12	20.00
TOTAL	60	100.00

SD = Standard deviation; SE = Standard error

The content and activities were developed and the VLE evaluation analysis, created from the ADDIE model, was applied with the application of the concepts of the Instructional Design methodology, which seeks the effectiveness in the presentation of the content, the ease of comprehension of the material, the adhesion and motivation of the professionals to the presented problem, as well as the evaluation of improvements in each step.

The following is a description of what was done in each of the phases: Analysis - the identification and characterization of the target group were the Nursing team that works in an Adult Intensive Care Unit of a teaching and large hospital. The topics to be addressed in the VLE were chosen, which were the information used in the day to day care

delivery of the severe patient, focusing on patient safety. The activities were carried out during the three months of VLE implantation, which could be carried out during the working day or after the working day, depending on the choice of the employee. The VLE can be accessed by smartphones, desktop computers, laptops or tablets available by the unit or for personal use, according to the employee's choice. It is noteworthy that the tutors responsible for the creation and administration of VLE were the researcher and guiding the study. One also counted on the support technicians, who were two nurses duly trained to support the participants without any conflict of interest.

Design and Development were outlined and a specific e-mail account was created for the creation of VLE (uticonv.hospitaldebase@gmail.com). For access to WIX®, available on the internet for free and fully interactive and intuitive use, a page was created (https://uticonvhospitaldeb.wixsite.com/enfermagem), noting that all content was strictly educational and non-profit.

Digital resources and materials were produced and adapted in specific media, the structuring and organization of activities in the tools for content evaluation, definition of the parameters of virtual environments and the preparation of pedagogical, technological and administrative supports. The researcher and work supervisor, without the help of a specific professional in the field, were created all the necessary materials.

The content of the VLE was made available, which was duly planned and based on institutional objectives. The mission, vision and values of the institution were inserted in the first instance. Also added was the Internal Regulation of the Unit, which is composed of natures and purposes, composition, functions, personnel and their duties, routines, norms and prohibitions.

The protocols based on the six WHO International Patient Safety goals were then inserted. The following protocols were developed and reviewed, among them: Patient Identification; Medication Safety; Prevention of Pressure Injury; Prevention and Post-Fall Pipeline; Patient Restriction and Intra-Hospital Transport.

Courses were designed, with classes being developed in the program for creating/editing and displaying graphic presentations Microsoft PowerPoint®, version 2010, with contents exposed regarding the assistance protocols and articles previously cited. Evaluative questionnaires containing both multi-choice and essay questions were available. Employees had individual folders to respond to evaluations managed by Google Drive®, since this interactive document allowed employees to approach, clarify doubts and perceive the individualized knowledge of each item evaluated. In addition, different training profiles were developed between Nursing technicians and nurses.

The discussion forum was based, practically, on two fronts: the first one in posts in which the collaborator could publish any doubt related to the activities, group discussion or even novelties of the unit itself; in the second strand, the forum had a space for the publication of videos related to health.

In the VLE, a space was created for the employee to send any doubts, both on the exposed contents and the difficulty of access, immediately to the manager's e-mail, directly and quickly, to facilitate communication between the parties.

In the Implementation, after the creation of the VLE templates and the adaptation to the contents, the registration of the employees of the unit was planned. At that time, e-mails, logins and individual passwords were created for participation in the environment. Then, a training was conducted with each collaborator to carry out the accesses and the proposed activities. It should be emphasized that it was extremely important that the tutors and support technicians remain in the different work shifts to clarify the doubts about access, especially in the first days of implementation to the VLE. It is added that, throughout the use of VLE, employees have been posting the activities in their specific folders linked to Google Drive®. With this, the tutors and support technicians made the individual return to the employees through a specific document previously created.

In the Evaluation, the analysis of learning as a multidimensional aspect was presented through an anonymous questionnaire for the self-assessment of the professional about his/her own learning and for the analysis of the Instructional Design regarding the contents and resources used to consider the efficiency of the methodological proposal.

It was verified that the VLE had 1,385 accesses computed per access counter directly installed on the site; there were 103 posts of interaction messages in the discussion forum, with 483 views, and 19 videos were posted, with 138 views.

In Table 2, in relation to the evaluative and personalized questionnaire of the importance of VLE use, the Intensive Care Unit (6.1.3).

Table 2. Evaluative and personalized questionnaire on the importance of VLE use in Intensive Care Unit. São José do Rio Preto (SP), Brazil, 2018

Questionnaire 6.1.3 - Evaluation of Acquired Content - Question 1	Records (N)	Proportion(%)
1. Less than expected	1	1.67
2. Regular	2	3.33
3. Expected	32	53.33
4. Better than expected	25	41.67
Questionnaire 6.1.3 - Evaluation of Acquired Content - Question 2		
1. Less than expected	2	3.33
2. Regular	9	15.00
3. Expected	27	45.00
4. Better than expected	22	36.67
Questionnaire 6.1.3 - Evaluation of Acquired Content - Question 3		
1. Less than expected	2	3.33
2. Regular	8	13.33
3. Expected	30	50.00
4. Better than expected	20	33.33
Questionário 6.1.3 - Avaliação do Conteúdo Adquirido - Questão 4		
1. Less than expected	2	3.33
2. Regular	8	13.33
3. Expected	36	60.00
4. Better than expected	14	23.33
Questionnaire 6.1.3 - Evaluation of Acquired Content - Question 5		
1. Less than expected	2	3.33
2. Regular	16	26.67
3. Expected	31	51.67
4. Better than expected	11	18.33
Questionnaire 6.1.3 - Evaluation of the Communication Process - Question 1		
1. Less than expected	1	1.67
2. Regular	15	25.00
3. Expected	37	61.67
4. Better than expected	7	11.67
Questionnaire 6.1.3 - Evaluation of the Communication Process - Question 2		
1. Less than expected	2	3.33
2. Regular	8	13.33
3. Expected	29	48.33
4. Better than expected	21	35.00
Questionnaire 6.1.3 - Evaluation of the Communication Process - Question 3		
1. Less than expected	18	30.00
2. Regular	14	23.33
3. Expected	21	35.00
4. Better than expected	7	11.67
Questionnaire 6.1.3 - Evaluation of the Communication Process - Question 4		
Still do not know	5	8.33
No	2	3.33
Yes	53	88.33
Total	60	100.00

DISCUSSION

Reported experiences in the literature have been reported, that have shown the development and use of Information and Communication Technologies (ICTs) as cause of the impact and opportunities for the growth of the Nursing profession. It is shown, through the construction of courses in the health area with technological resources, a varied way of approaching emerging and specific themes in the qualification of students and professionals. It is noticed that the majority of the educational resources that are presented in the literature points to the internet as mechanism of communication.[11]

It was considered, in the hospital setting, the process of caring and managing as the main dimensions of nurses' work. In this context, the Intensive Care Unit (ICU) is characterized by a scenario of innovation and specialized Nursing care for patients of high complexity, enhancing the constant need of a professional with a certain profile to act in this area and harmonizing the service between technology and care.[16]

The data from this study confirmed a Nursing working in the ICUs predominantly female, which also demonstrates the research of a literature review, performed with 24 studies,[16-8] in which the woman is the majority in care in the hospital environment, an aspect that reflects the cultural tradition, emphasizing that the gender issue is associated to the assignment of tasks and to the roles, particularly, in the Nursing profession.[19]

Results were found showing an age range between 31 and 40 years, which is in line with this study, showing a prevalent age group in the Intensive Care Unit between 23 and 58 years.[20-1] In a second study, in 28.5% of the articles selected, workers were younger than 40 years of age, [16] showing a young population, with the possibility of increasing scientific and technical knowledge in high complexity. It is possible to relate the presence of nurses under the age of 40, working in the ICU, to the fact that these professionals, when they reach this age, are relocated to other sectors, seek administrative positions, seek teaching or even quit the profession, [22] demonstrating a tendency to seek critical care areas for professional experience.

When analyzing training time, a period between one and 25 years was revealed, which shows that, in this sector, there is the possibility of finding a Nursing team with little experience to deal with specific situations and critical care. It was also reported by these authors that those with greater experience in the profession[23] presented a variety of professional training time, which allows the development of skills, safety and experience for decision making, corroborating the data of this study.

A method was used to design and develop the virtual learning environment, which corroborates a work developed in Piauí, where a virtual teaching environment was developed, consisting of on-line pages consisting of didactic-pedagogical material in Histology. Information and Communication Technologies (ICTs) were used as complementary tools for the teaching of this subject to health students. The following ICTs were developed: videos, animations, virtual classes, virtual atlases, simulated online and chat, which were available on the internet.[24]

It was verified that, based on the evaluation process of the virtual learning environment, the basis was the completion of self-assessment questionnaires, in which the majority (84%) judged that the goals were achieved and that the development of its activities. In a study carried out in Tiradentes (MG), it is worth noting that the idea of a formative evaluation can be implemented and that the means of constructing its own system of observation, interpretation and intervention should be developed according to its personal conception of teaching, objectives, didactic contract and learning.[25]

It was noted, in relation to the content and knowledge acquired, that the majority (80%) pointed out that the content exposed, as well as access to the protocols, clarification of doubts and discussion of varied subjects would be within the expected, or rather expected. Therefore, the topic addressed - patient safety - is an important intentionality that must permeate the teaching and learning process of health professionals, since the longer the intellectual preparation and the motor skills in simulated environments, prior to providing care to patients, the greater the degree of safety of professionals in the practice of care and, consequently, in patient safety, according to the World Health Organization.[26]

Another factor was considered as favorable for the construction of knowledge, which was the possibility of finding, in VLE, scientific texts closely related to what needed to be studied, which was also demonstrated in the study carried out at the Federal University of São Paulo with undergraduate students of Intensive Care.[27] It is also possible to learn the incorporation of different media from the

multiple potentialities, capacities and interests of learners, since it contributes to the construction of individual and collective learning.[28]

It was reported, in relation to the evaluation between the interaction to the team, that the majority (75%) approached the group and the leader. It is also added that 70% reported that the communication process was within the expected, or better than expected. It was possible, through the forum developed in the VLE, the interaction between the participants, the elaboration of discussion in groups and the construction of a new thought, corroborating the study developed by the University of Tiradentes showing that the forum allows the student to make a self-assessment of their answers and thoughts on the subject, building their own path and their own learning through the research and curiosity generated by the studied subject.[20] The forum is built on a very versatile asynchronous tool, which can be structured in a variety of ways, such as general discussion with several themes, questions and answers or a single discussion. The forum also allows a quantitative and qualitative evaluation of each message.[29]

Participants were asked if VLE would be an important tool for continuing education in the unit and achieved a positivity of 88%. Thus, it was evaluated the association between VLE and hospital practice, because the professionals could perform exercises that favored the understanding of the contents and, consequently, the ability to use them in practical situations, generating satisfactory results, or be able to associate thought, action and good results.[30]

As limitations in the development of this study, we found the lack of published materials related to the use of VLE in the hospital environment, which may intimidate creation initiatives in the Nursing area. It is intended to materialize, as future goal, by the authors of this study, the stage of evaluation of the technical activities performed by the Nursing team of the virtual learning environment.

CONCLUSION

It was considered that the objective of this study was reached and it was possible to prove the development and implementation of a tool for continuing education for the Intensive Care Nursing team using VLE containing online activities using free technologies, access on mobile devices, promotion of continuing education through videos, interactive texts, protocols and scientific articles, stimulating the discussion of specific topics and the debate in the forum.

It is concluded that the results of the quantitative and qualitative stages of the research allowed to infer that the construction of knowledge can be increased by the union of teaching strategies that allow the professional autonomy, the dialogic relationship and the deepening of the contents.

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