



Building a Virtual Learning Environment for Distance Education in Nursing Oncology

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Abstract

Objective: Describing the process of building and implementing an educational program using the Moodle platform.

Methods: An experience report study of the planning and implementation stages of an online educational project for the training of nurses working in an Oncology hospital.

Results: The course entitled "Introduction to Oncologic Nursing" was organized based on the ADDIE model, centered on the steps of Contextualized Instructional Design (CDI) from Moodle resources. The educational program was organized into three modules, containing activities arranged in topics directed to inform, promote individual and group discussion, as well as promote interactivity and collective construction.

Conclusion: The VLE-Moodle may represent a possibility for the continuing education of nurses, however the structure of a teaching plan that considers the peculiarities/challenges of distance learning and the desired educational goals is crucial.

Keywords

Continuing education, Nursing education, Distance education, Virtual learning environment, Oncology

Introduction

The new demands of a globalized and competitive market have targeted health services to have an attitude focused on client welfare, through a process of providing services with quality [1], whose advantage is in the intellectual capital of its human resources [2] which result from continuous processes of education [1].

In the sphere of hospital management, we seek to initially ensure the qualification of the professionals in employment and selection, then in training processes and performance evaluation. Among these health worker, special attention should be given to the Nursing staff/faculty, for representing the largest contingent of professionals and the direct and permanent performance established with internal and external clients [3].

Therefore, in order to establish a level of quality, educational plans should be established for health workers, with goals that may

include the improvement of professional practices, orientation of institutional development initiatives, promotion of innovative health care strategies, among other proposals encompassing the area of Continuing Education (CE). CE must directly reflect the daily practice of professionals, combining theory and practice, in which the learning and the teaching are incorporated into the daily work of organizations [4].

The oncology nursing is a specialist field of nursing and recognised as such worldwide and the qualification of nurses to practicing in oncology is a contemporary need generated by various factors such as a gap left in the training by the Bachelor of Nursing, considering that some undergraduate courses do not have the cancer epidemiology in Brazil discipline inserted in their curriculum [5,6]; regional inequalities and infrastructure gaps for rehabilitation to prevention actions; technological complexity contained in the specialization; the increasing development of institutions specialized in cancer treatment; and the need for equal development for public policies that also have this agenda [5].

The distance compared to traditional teaching, has equivalent or better results for the purposes of knowledge and skills development, strengthening a mode of education does not exclude or is better than the other, but are distinct characteristics that, when well designed can produce meaningful learning [5]. Currently this type of education can be considered as being as a technological innovation and an important source of competitive advantage [7].

The challenge posed was the adaptation of a training program in Nursing Oncology from being face-to-face to a DL form, using a computational resource to host the educational project - the Virtual Learning Environment *Moodle*.

Objective

To describe the building and implementation process of an educational program using the Moodle platform.

Methods

This is an experience report study conducted by understanding the detailed description of the construction process and implementation of an educational program for nurses in an oncology institution, The

C Camargo Cancer Center, located in São Paulo (SP), Brazil.

The development of the educational program in DL occurred in the months of May to August 2013 in the hospital setting, within the sector of Continuing Education, in which four nurses with at least three years' experience in Oncology participated.

VLE-MOODLE context of development

This course already existed in the institution (also named as "Introduction to Oncologic Nursing") and was applied in the traditional format. The number of nurses who entered the institution over the past four years was 148 professionals. This demand generated by an institution in the process of expansion boosted the adaptation of a training program in Nursing Oncology from face-to-face to DL.

The study was part of a master's thesis, and its project was submitted and approved by the Ethics Committee in Research (CEP/UNIFESP nº 220.554 and CEP/ACC amargo Cancer Center nº 241.076).

Results

The construction and development stages of the course on Introduction to Oncologic Nursing using the Moodle platform were organized into items and sub-items for better understanding.

Personalization, construction and development of the VLE-Moodle were based on the ADDIE model (abbreviation which stands for *Analysis, Design, Development, Implementation and Evaluation*) [8,9], and on the steps proposed by Filatro (2010) [10], who describes how to prepare a VLE, including the possibility of creating Contextualized Instructional Design (CID), as well as ways to operationalize it. The option to pursue a conceptual and theoretical framework brought forward facilities for achieving the research phase and the possibility of qualifying the experiment. For Filatro (2010) [10], five actions must be present in the building and development process of a DL program: Analysis, Design, Development, Implementation and Evaluation, which are described below:

Analysis

Consisted in identifying learning needs and defining target audience characteristics considering environmental, economic, administrative, and technological infrastructure constraints, as well as objectives, content, techniques and workload of the course [10,11].

Defining human and financial resources: At this stage, the division of the content into three modules was defined, available information and bibliographic references were collected, the profiles of teaching professors and author professors were reviewed, and an analysis of infrastructure and investment was required to complete the course was conducted.

The course Introduction to Oncologic Nursing was developed based on the AC Camargo Cancer Center's need for nurse training, in order to provide quality care in the areas of prevention, education and care within the specialization of Oncology.

For the characterization of the target audience regarding digital fluency, the institutional setting of the study made it possible for 100% of professionals to have access to the Internet, as they use computers on a daily basis in the workplace, and the institution has adopted electronic medical records. This fact is relevant, therefore, to establish training programs with educational technology, as it is important to raise the familiarity of the participants with using and accessing computers [9]. At this stage computer equipment, along with the financial, human and physical resources were also defined. Among these resources, we opted for the Moodle virtual environment. The choice was guided by the availability of this environment on the AC Camargo Cancer Center server. Regarding computer hardware resources, computers that were available in the institution were used.

Defining the technological resources used in the VLE: PDF®, Word® and PowerPoint® software programs from the Microsoft Office® package were used for text editing and presentation.

The ludic activities of evaluation were developed using the Hot Potatoes program, an authoring tool for the creation of interactive tests with virtual environments. The program has the advantage of the possibility for creating various types of activities with automatic correction and export activities in HTML format (*Hyper Text Markup Language*) [11]. This program offers five types of exercises: *JCross* (crosswords), *Jmatch* (find the correct pair), *JQuiz* (multiple choice test), *Jmix* (arrange the sentences in the correct order), *JClose* (fill in the gaps) [12]. The crossword (*JCross*) and fill in the blanks (*Jclose*) exercises were used for this study.

Figures and drawings used in the course were obtained from open and free stock photos, such as Google®. The option to use several images brings motivation, interest, and ease in understanding content, among other advantages that improve the student's adherence to content [13].

Design and development

The structure and sequence of content, instructional design and the selection of media for presentation and production of instructional activities were defined in these phases [10-14]. The design phase involved the planning and structure of the course, including the sequence of content, definition of strategies and activities, and a description of the materials that were used by the participants and teachers [14]. The construction of the course was held from May to August 2013, and during this period, the matter to be addressed in national and international databases were searched from books on Oncology bases and Nursing Oncology and data sites epidemiologic.

Defining interaction in VLE: To this end, the five patterns of interaction in the virtual environment were considered, and are listed below [9,10,15].

Information standard: Considering this standard, the Course Guide was developed containing information such as objectives, content per module, teachers, a activities to be performed. Also a welcoming presentation and video of teaching professors and author professors was prepared.

Supplementary standard: Emphasis in this standard was given to the content contained within the 12 classes and divided into three modules; texts available for reading and videos are used as a way to reinforce the content.

Essential standard: This standard emphasized the activities, and consisted of integrating hypertext about the activity to fill the gaps, decision-making on a clinical case involving chemotherapy, radiotherapy and a case study in a comic strip about a situation involving lymphedema. Another activity inserted within this standard was the glossary, which requires an active approach from the participant using internet access by way of self-learning.

Immersive and collaborative standard: Emphasized the communication activities offered with various activities such as a forum for clinical case discussion and a scientific article on mucositis; the construction of a collective questionnaire on nursing assistance to patients with oncologic diseases pulmonary, neurological and orthopedic using Wiki and participated in a study conducted on stomas.

Definition of objectives

Other aspects of paramount importance in the development of an online course are defining objectives, producing appropriate reading material and creating an organized and efficient script. Therefore, by considering such a perspective, the course was designed according to Bloom's taxonomy, following the cognitive, affective and psychomotor domains [11,16]. The cognitive domain is related to knowledge, comprehension, application, analysis and evaluation of knowledge; the affective domain relates to feelings and attitude, concerning how the individual receives, responds, values and internalizes a fact or phenomenon; and the psychomotor domain refers to capabilities and specific physical abilities, as well as the transformation of theory into practice using mechanisms of perception, response, and performance,

as well as materials and other equipment [16]. Among the advantages of using taxonomy in the context of education there are:

- Providing the basis for developing assessment tools and using different strategies to facilitate, evaluate and stimulate the performance of students at different levels of knowledge acquisition.
- Encouraging educators to assist their students in a structured and conscious way to acquire specific skills from the perceived need to master simple skills, such as facts, and later to master the more complex skills such as the concepts [16].

Defining course design

The themes addressed were listed into modules, with the beginning of the presentation of the course and the division of the modules as shown below. For each module there was a question and answer and also all the material that would be used in the course was separated following the names of the corresponding modules which contain:

- Articles selected according to the analyzed content; o Learning objects
- Texts for mandatory and supplementary reading; o Printing material (all classes in PDF format)
- Videos with topics related to content; o Assessment tests.

Description involving the division of modules:

All modules include interactive activities with self-assessment sections containing feedback to reinforce or correct the answer, requiring critical thinking, demonstration of new skills and knowledge from the participant. This method was adopted assuming that when students are involved in the evaluation process, it may result in greater interest and involvement with the content [17].

Definition of tools based on the learning process

The choice of resources had the objectives of enabling and encouraging interaction and collaboration among participants, strengthening their autonomy and exercising reasoning capacity, as well as implementing and evaluating the acquired knowledge.

The resources used based on teaching learning processes were: videos, forums, wiki, and quizzes. In preparing the course, we opted not to use synchronous tools (chat), despite it being considered a form of collaboration and interaction. The justification for this decision was guided by the workload of the course, for it being relatively short, and the difficulty that the participant and teacher would have to reconcile the different roles and responsibilities with the study activities and with the synchronous meetings [1,18].

In order to boost online learning to make it interactive and personalized, a pedagogical agent was created [14] for each theme to act as a tutor in each prepared class. In practice, this initiative works as follows: each class has a different person representing a pedagogical agent, who plays the role of helping the participant in interacting with the addressed content, informing and strengthening the purpose of the studied themes and to provide a timeline regarding the class progress. No images used had any movement and the communication was performed using a 'speech balloon' positioned next to person.

Assuming that the development of the course was based on constructivist design, in which knowledge emerges from the practical reality of the participant and from their own learning [19], thus clarifying the content was imperative according to their types of being factual, procedural, and attitudinal as a starting point for learning [20]. Below are descriptions of the content types and their correlation with the course in question.

Factual content: Knowledge of facts, events, situations, data, concrete and singular phenomena. In this aspect, attitudes such as the understanding, analysis and engagement with the concepts and activities are expected. In this course, the definitions and nomenclatures in oncology, epidemiology and cancer prevention

were considered factual content. As learning this kind of knowledge is based on repetition activities, activities such as a glossary and association of answers on cancer incidence were inserted.

Procedural content: It includes technical rules, methods, skills or abilities/strategies, and procedures; meaning a set of ordered actions for accomplishing an objective. For this type of content, attitudes like ability to order, perform and apply an action are expected. Procedural content can comprise everything that is related to nursing care in treating, controlling symptoms and specified surgical oncology.

With this content, learning happens through actions and/or through situations of cognitive character, such as text commentary. Therefore activities solving clinical cases were developed involving: radiodermatitis classification, Antineoplastic Therapy spill and leakage, Lymphedema and stomas; reading and text commentary on mucositis and preparing a questionnaire on the subject: Specificity in assisting nursing to patients with oncologic diseases pulmonary, neurological and orthopedic.

Attitudinal contents: Grouped in values or principles, attitudes and standards, where each has a different and specific nature. At this point, commitment to the learning program, extenuating the desire to learn, an ability to make decisions and self-assessment are expected as attitudes [20]. In this context, the relationship with the course was based on participation in activities, interaction with teachers and other participants.

Furthermore, we sought to strengthen the role of the teacher as a way to put the adopted resources into practice and so that they were consistent with the learning process, since no technology can replace the role of this professional; they are essential for interaction, development and adherence to the course [21]. Thus, a teacher's manual has been prepared and training was conducted as a way to present all the tools contained in the VLE and standardize the teaching/transmission of the course.

Implementation

At this stage configuring educational tools and technological resources from the VLE Moodle occurred with enabling access to the course. How to train participants to use the developed materials was defined; also, the user environment in the VLE and a didactic event was implemented involving verification of the cognitive process, forming social relationships in the group, the assessment process and the feedback to be performed by the teacher [10].

At that moment there was assistance from a design professional who constructed the Learning Objects (LO) along with the main researcher. A multidisciplinary support team is recommended to build the LO, with the web designer being one of the professionals cited [22].

Another task contemplated at this stage was registering the participants and the availability of passwords to access the course on the Internet. The release of passwords was performed by a Moodle support professional that was active in the institution where the course was held.

Evaluation

At this stage we performed a review of all content to identify and correct errors. Furthermore, the design will be evaluated throughout the course for its continuous improvement [10].

As Filatro (2010) [10] did not suggest a tool or guide for evaluating the VLE, we opted to use the one available from Moodle, *Constructivist On-Line Learning Environment Survey* (COLLES), for its comprehensiveness and ease of use. This tool is available for use in the Moodle environment, and aims at monitoring the interactive Web capabilities to engage participants in dynamic teaching activities [23]. Regarding the evaluation process, the training process was operationalized through content fixation exercises developed in multiple choice format, as well as participation in the forums and wiki.

Discussion

We emphasize that in the analysis of ideation phases and development of VLE-Moodle the importance of the theoretical and methodological support necessary to define the steps to be undertaken as well as the intended results, which in a certain way, favored the detailed construction of education planning, including a teacher's manual.

The use of a ADDIE model based on Contextualized Instructional Design (CID) in planning the VLE has made a contextualized and safe action in the present study possible, to the extent that it was possible to systematize the process as methods and teaching methods, with reference to the known principles of learning a contextualized and safe action, to the extent that it was possible to systematize the process as teaching methods and techniques, with references to the known principles of learning [9,14].

The choice of media and resources used in the course was supported by two studies. One of them, with nurses and doctors, was conducted in the state of Ceará, Brazil, in which the objective was to assess the acceptability of a course based in DL among professionals working in the Family Health Program. In this study, the participants proposed a list of recommendations to help the planners of the course, consisting of the four media suggested for use being printed material, video, computer and TV [24].

Another resource used the quiz, and this was also a choice guided by another study with 159 students in the third year of medical school at a Brazilian university in the city of Volta Redonda, about using the Quiz in an electronic questionnaire for self-assessment and learning in genetics and molecular biology. The results reflect excellent acceptance by students who were submitted to the tool, mainly aiming at increasing their interest in the topics approached and the possibility of recognizing the specific sub-themes of each student's deficiencies, thereby making corrections in the learning process, and it can also be used in classroom education programs and/or distance learning [25].

The research showed that the adopted methodology enabled achieving the study objectives and the program of the construction process was facilitated by the possibility of organizing tasks and resources that Moodle offers, which enabled the implementation of pedagogical proposals in order to provide an instructional model for the educational processes in Nursing [26]. Thus, we found that the introduction of technology in health education has the potential to be incorporated and indicates the future for the teaching-learning process [27,28]. It is possible to offer quality DL, provided there is appropriate didactic planning carried out with a preparation of materials that have relevance with the adopted pedagogical concept [29], as well as the support of a transdisciplinary team, as evidenced in studies [25,30]. Developing online educational material is a challenging task and developing material that provides enjoyable and interactive learning is even more complex [26].

Final Considerations

The building process of the program was facilitated by the possibility of organizing tasks through the resources that Moodle offers. VLE-Moodle resources made the implementation of pedagogical proposals possible in order to provide an instructional model for the educational processes in Oncology nursing. Among the key factors for implementing CID steps, the present study highlights: getting to know the target audience, the degree of difficulty of the content, being properly related to different teaching strategies, an evaluation being made available in VLE, and the time required for the teaching and learning process to be satisfactory.

Author Contributions

The authors Maria das Graças Silva Matsubara and EdvaneBirelo Lopes De Domenico equally participated in all stages of preparing the article.

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