Revista Brasileira de Enfermagem
REBEn

THEMATIC ISSUE:
EDUCATION AND TEACHING IN NURSING

RESEARCH

Plataforma PEnsinar®: a learning tool for teaching the nursing process

Plataforma PEnsinar®: ferramenta de aprendizagem para o ensino do processo de enfermagem

Plataforma PEnsinar®: herramienta de aprendizaje para la enseñanza del proceso de enfermería

Erik Cristóvão Araújo de Melo[I], Bertha Cruz Enders[II], Marta Lima Basto[III]

[I] *Universidade Federal de Campina Grande. Campina Grande, Paraíba, Brazil.*
[II] *Universidade Federal do Rio Grande do Norte. Natal, Rio Grande do Norte, Brazil.*
[III] *Escola Superior de Enfermagem de Lisboa. Lisbon, Portugal.*

How to cite this article:
Melo ECA, Enders BC, Basto ML. Plataforma PEnsinar®: a learning tool for teaching the nursing process. Rev Bras Enferm [Internet]. 2018;71(Suppl 4):1522-30. [Thematic Issue: Education and teaching in Nursing] DOI: http://dx.doi.org/10.1590/0034-7167-2016-0411

Submission: 11-09-2016 **Approval:** 11-02-2017

ABSTRACT

Objective: to describe the construction and transition phases undertaken in the development of a virtual learning environment named Plataforma PEnsinar® (PEnsinar Platform®). This platform aims at teaching the nursing process and the nursing classifications NANDA International, NIC, NOC and ICNP®. **Method:** this is a methodological and technological development research that used construction and transition phases of the software development process named Rational Unified Process. **Results:** the software was developed in the construction phase. Unit and integration tests of components of interfaces were held. In the transition phase, the complete system was showed to the users. It was completely working considering the applicability and employment, under conditions to be implemented and evaluated. **Conclusion:** the study showed how the construction and transition phases of the Plataforma PEnsinar® were developed. It was based on a proposal that inserts the student as an active agent in the nursing process and the professor as a mediator, providing tools that will contribute to a better learning.
Descriptors: Nursing; Nursing Process; Classification; Nursing Education; Educational Technology.

RESUMO

Objetivo: descrever as etapas de construção e transição realizadas no desenvolvimento de um ambiente virtual de aprendizagem (Plataforma PEnsinar®) voltado para o ensino do processo de enfermagem e das classificações Nanda Internacional, NIC, NOC e CIPE®. **Método:** trata-se de uma pesquisa metodológica e de desenvolvimento tecnológico que utilizou as fases de construção e transição do processo de desenvolvimento de *software*: *Rational Unified Process*. **Resultados:** na fase de construção foi desenvolvido o *software* e executaram-se os testes unitários e integrados dos componentes das interfaces. Na transição, mostrou-se aos usuários o sistema completo e em funcionamento para a aplicabilidade e emprego, em condições de ser implementado e avaliado. **Conclusão:** o estudo mostrou como foi desenvolvida a construção e transição da Plataforma PEnsinar®, baseada em uma proposta que insere o discente como agente ativo no processo de enfermagem, e o docente como mediador, fornecendo ferramentas que possibilitarão um melhor aprendizado.
Descritores: Enfermagem; Processos de Enfermagem; Classificação; Educação em Enfermagem; Tecnologia Educacional.

RESUMEN

Objetivo: describir las etapas de construcción y transición realizadas en el desarrollo de un ambiente virtual de aprendizaje (Plataforma PEnsinar®) destinado para la enseñanza del proceso de enfermería y de las clasificaciones Nanda Internacional, NIC, NOC y CIPE®. **Método:** se trata de una investigación metodológica y de desarrollo tecnológico que utilizó las etapas de construcción y transición del proceso de desarrollo de programa (*software)*: *Rational Unified Process*. **Resultados:** en la etapa de construcción fue desarrollado el *software* y se ejecutaron las pruebas unitarias e integradas de los componentes de las interfaces. En la transición, se mostró a los usuarios el sistema completo y en funcionamiento para la aplicabilidad y el empleo, en condiciones de ser implementado y evaluado. **Conclusión:** el estudio mostró como fue desarrollada la construcción y la

transición de la Plataforma PEnsinar®, basada en una propuesta que inserta el discente cómo agente activo en el proceso de enfermería, y el docente como mediador, suministrando las herramientas que posibilitarán un mejor aprendizaje.
Descriptores: Enfermería; Procesos de Enfermería; Clasificación; Educación en Enfermería; Tecnología Educacional.

CORRESPONDING AUTHOR **Erik Cristóvão Araújo de Melo** E-mail: erikcristovao@hotmail.com

INTRODUCTION

The development of the nursing process (NP), using the classification systems, is critical for strengthening the science of nursing. It provides a method to organize the care, making it effective, and promoting a unified language for the profession[1].

A study carried out in Brazil showed that the NP still occurs in a fragmented and fragile manner, mainly due to: lack of interest of institutions/work environment on the expectations of the nursing professional; distortion of its real image by part of the society and public administrators; change of the nurse's role in healthcare practice; technical and scientific unpreparedness of professionals; and disorganization of their process of work[1-2].

Particularly in the educational area, these difficulties are related to an education with a learning process based on a biomedical and traditional model. The teaching process is focused on the disease, on the professor, on the technicality and marked by the lack of curricular transverseness[3]. We can also relate them to the lack of integration between the 'knowing' and the 'making', given that the 'knowing' underestimates the practice, while the practice disregards the 'knowing' as reference to the critical reflection on the 'making'. The reorganization of the NP process will be able to promote the desired change of this situation, especially in the process of strengthening the permanent education of professionals and in the teaching and learning of students in the education institutions[2].

Aiming to transform this scenario, the use of innovative pedagogical methods and resources are suggested. A few examples are interactive classes, discussions of problems/clinical case studies, questions and online studies, with the aid of educational technologies[4-5].

To accomplish this paradigmatic change, we used the sociological and historical theoretical approach of Lev Vygotsky, a distinguished Russian researcher in the area of learning and development. In this perspective, individuals are fully developed with the help of their fellow creatures, in the social, cultural and historical environment in which they live. We highlight the role of 'the others' in this process, Vygotsky created a concept for understanding the relationships between development and learning, called the Zone of Proximal Development (ZPD)[6-7].

We suppose that a virtual learning environment (VLE) will be useful for the education of a critical and reflective nurse and for the development of a Nursing with more autonomy and quality. However, for thus, we need an approach that integrates the NP steps (assessment, nursing diagnoses, planning, implementation and evaluation) and the available classification systems [NANDA International (NANDA-I), Nursing Interventions Classification (NIC), Nursing Outcomes Classification (NOC) and International Classification for Nursing Practice (ICNP®)] with an education proposal based on theoretical contributions which value the student as a protagonist of the teaching-learning process.

OBJECTIVE

To describe the construction and transition phases during the development of a virtual learning environment (Plataforma PEnsinar®) aiming the teaching of NP and the classifications Nanda International, NIC, NOC and ICNP®.

METHOD

Ethical aspects

The construction of this technology achieved the requirements of resolution no. 466/2012, being approved by the Research Ethics Committee with Human Subjects (REC).

Study design, location, and period

This is a methodological research based on technological development. This type of research aims at the systematical use of the existing knowledge to develop or improve an instrument, device or method of measurement which is valid and reliable.

A methodology based on software engineering, named Rational Unified Process (RUP), was used in the process with a more effective development, aiming to reduce existing risks in any software project. This process comprises the phases of inception, elaboration, construction, transition and production[8-9]. This study will only show the phases of construction and transition.

The RUP is a model consisting of discrete phases, with an evolutionary perception, which works through an interactive and incremental process. It outstands due to the use of more effective resources and characteristics, recognizing the need of communication between the actors of the process, which are essential in the construction of modern software programs[8-9].

The construction and transition phases of the Plataforma PEnsinar® were developed in 2014 and 2015, as part of the doctoral dissertation "Building of a Virtual Learning Environment for application of the nursing process based on the Nanda International, NIC, NOC and ICNP® (*Construção de um Ambiente Virtual de Aprendizagem para aplicação do processo de enfermagem baseado na Nanda International, NOC, NIC e CIPE®*)"[10], and during the activities of an Inter-University Exchange program in Portugal, in 2014. There was collaboration of researchers from the Nursing Research & Development Unit (ui&de) of the Lisbon School of Nursing (Esel) and of the Accredited Centre for Information Systems Research and Development (CIDESI) of the Nursing College of Porto (ESEP), which is characterized as an Accredited Centre for Information Systems of the International Council of Nurses (ICN).

Phases of the Rational Unified Process (RUP)

Construction

In the construction, the components of the software were developed by the engineering software team, which made operational the elements defined in the previous phases (inception and elaboration). The inception aimed the communication with the client and planning, identifying the external entities (people and functions) that will interact with the system. As for the elaboration, the activities of communication, planning and process modeling were developed[8-9].

The necessary resources and functions required in the previous phases of planning and modelling were implemented, based on the NP steps (assessment, nursing diagnoses, planning – priorities, outcomes and interventions –, implementation and evaluation), using data bases with the nursing classification systems Nanda International, NOC, NIC and ICNP®. All classification systems were approved and released by their respective entities for use in the research.

For management and applicability of these elements, the platform consisted of three functional areas: professor area, which provides the management of clinical cases and students; student area, in which the student is inserted in a clinical case for analysis and, subsequently, has to choose one of the classification systems (Module Nanda-I/NOC/NIC or Module ICNP®) for, then, to be directed to the NP construction area.

Didactic and pedagogical tools (examples, texts, audios and videos) were also included to the explanation of each NP step and of each classification and mediation means of the professor (chat for correction, tips, help, etc.). This matches with the theoretical presuppositions of Lev Vygotsky on the potentiation of the ZPD, given that the student becomes an active agent, and the professor, a mediator in the construction of knowledge.

After the idealization of all desired resources and functions, unit and integration tests of components were carried out to assess the expected operation of the platform.

Transition

At the end of the construction phase, a properly working software system in a real operational environment was obtained, ready for the transfer to users. This moment culminated with the delivery of the system, i.e., the transition phase.

The researchers responsible for the management of the platform received training and an operating manual so they could use the tool, clearing up doubts and making some adjustments to a satisfactory performance of the system.

The platform is currently fully used by students and professors, with the aim of a future evaluation. This phase is named production, which will promote a feedback, informing defects and necessary changes[8-9].

RESULTS

Construction

Professor area

As illustrated by Figure 1, this area has the options of introducing several clinical cases or visualizing the previously inserted cases. These cases were designed to provide data that stimulate and facilitate the realization of the NP steps. After insertion of the clinical case, the professor continues with the inclusion of students. There are possibilities for editing or excluding the case, as well as adding or excluding students. When registering students in the case, the professor will be directed to the activities held by them in the NP construction area, in which all actions of students in the system are seen. The intervention of the professor is permitted at any moment, looking to evaluate, assist, advise or alert, so the mediation occurs by exchanging messages.

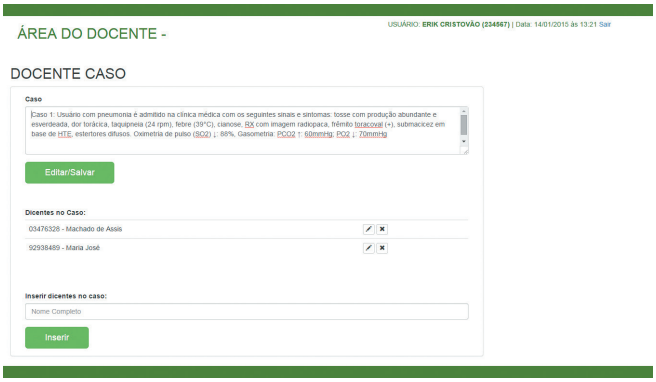


Figure 1 – Professor area interface of the Plataforma PEnsinar® to insert and edit cases and students, Natal, Rio Grande do Norte, Brazil, 2015

Student area

When students access their area (Figure 2), they will visualize the case in which they are inserted and will be directed to the NP construction area. Then, they will have to choose one of the modules (Nanda-I/NOC/NIC or the ICNP®), aiming to provide options, based on the proposed nursing classifications for the construction of the nursing diagnoses, outcomes and interventions, respectively.

Figure 2 – Student area interface of the Plataforma PEnsinar® for the case study analysis and nursing process construction, Natal, Rio Grande do Norte, Brazil, 2015

Nursing process construction area

Once students have chosen one of the modules, they will be initially directed to the case and will proceed to the NP steps (Figure 3).

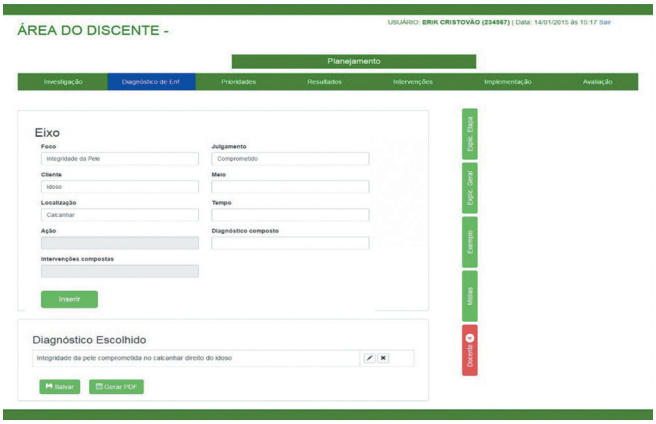


Figure 3 – Student area interface of the Plataforma PEnsinar® with the construction of one of the nursing process steps (nursing diagnosis), Natal, Rio Grande do Norte, Brazil, 2015

To carry out the assessment step, students will have at their disposal a validated data collection instrument to fill the information of the interview and physical examination, by means of checklist and text. A data collection instrument, which approached the Wanda Horta's Theory of Basic Human Needs, validated for Intensive Care Units, was used for the construction and transition of the platform[11]. However, any data collection instrument can be inserted to the assessment area of the platform by the administration team, depending on the specialty (adult's health, mental health, etc.) chosen by the professors and students.

Subsequently, if students choose the Module Nanda-I/NOC/NIC, the construction phase of nursing diagnoses, interventions and outcomes will appear. The complete data base of the Nanda International (titles, related factors, defining characteristics and risk factors), NOC (indicators/graduations) and NIC (activities) will be provided. Remembering: these classifications are connected by the Nanda International/NOC/NIC Linkages.

If students opt for the Module ICNP®, the terms of the seven-axis model will be offered for the construction of nursing statements of diagnosis, outcomes and intervention, respectively, as well as the option of using the combinatorial structure.

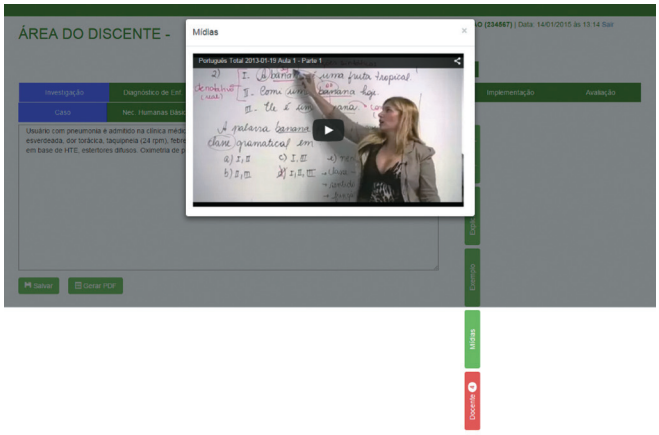
In the implementation, with interventions already chosen, the students will complement them with some information (how to do, when and by who) if needed, and thus will start the evaluation.

At any time, students will be able to create a Portable Document Format (PDF) with the summary of everything that was constructed, as well as archiving and printing the project.

Didactic and pedagogical tools

The platform will offer several didactic and pedagogical tools in each phase, such as: contents, explanations, examples, videos, audios and chat. The goal is to facilitate the understanding of the NP steps, the use of classifications and also the communication between student and professor. These tools are elements that aim to improve the ZPD and the communication, as well as to collaborate so that the theoretical and practical knowledge is passed on to students according with the evolution of the historical process, based on a sociological and historical perspective.

Figure 4 shows a video as an example of a didactic and pedagogical tool that students will be able to access in their area during the NP construction.



Source: Plataforma PEnsinar®

Figure 4 – Student area interface of the Plataforma PEnsinar® with the didactic and pedagogical tools available, Natal, Rio Grande Norte, Brazil, 2015

Transition

After the construction phase, the transition of the Plataforma PEnsinar® was held by the developing team of software engineering for the researchers. The platform was released fully operating and ready for use and training was provided for users, who subsequently tested all modules after receiving the user guide.

Subsequent to the transition phase, production and employment phases of the platform were conducted, which were characterized by the monitoring and continuous use of the system. Afterwards, this will result in the evaluation of the functional performance using the Evaluation Process Model, according to the standard ISO 9126-1. This will enable the software development, aiming to provide feedback, inform divergences and necessary changes and therefore always provide the improvement of the system.

DISCUSSION

Plataforma PEnsinar® is relevant to Nursing because it aims to provide mechanisms and tools that allow the improvement and development of educational processes of the nursing process and classifications, as well as the relationship between student and professor. By making learning more attractive, dynamic and accessible, this tool aims to assist in the paradigmatic change that we want: to make the student an active agent as an autonomous, critic and reflective subject of learning, who has the professor as mediator and thus make effective what the National Curriculum Parameters of the Undergraduate Nursing Courses suggest.

To guide and organize the construction of this educational technology, ensuring all the proposed requirements, we used the software developing process of RUP. The Rational Unified Process contributes with more effective resources and characteristics, recognizing the need of communication between the actors of the process, as well as an interactive and incremental sequence, which provides an evolutionary method, essential in construction of modern software programs[8-9].

In research carried out for the construction of a software, the authors observed that the RUP allowed the offer of elements which captured the learning on a process of software development in a conceptual model, in which a greater configuration, modification and improvement could occur with the flows of work[12].

The construction of Plataforma PEnsinar® meets a trend in the development of new technologies in the nursing area, requiring robust and reliable processes. In addition, this tool outstands because it was a methodological research, aiming to develop a reliable, precise and usable educational technology for nursing. This type of research systematically offers sophisticated knowledge, mechanisms, means and methods to elaborate an instrument or device in a valid and reliable manner. This is a major challenge for the nursing area, with respect to the systematization of studies to build and assess/validate these kinds of technology[12].

In Brazil, we have been observing an evolution of technological studies, with predominance of the development of educational technologies in 2008. The technologies that outstand are the descriptive and methodological productions[13].

In the period from 1986 to 2000, no expressive numbers of research were found in the area of nursing technologies in Brazil. However, a prominence in the studies of educational technology was noted. Another study identified that, between 1980 and 2009, there was a trend of technological productions for technical and higher education with students, technologies for health education with the community and technologies for continuous education with professionals[12].

The development of these technologies has been increasing, however discreetly. It is driven by the creation and improvement of graduate programs, as well as by the expansion of undergraduate courses and its appreciation due to financing from the Brazilian National Council for Scientific and Technological Development (CNPq)[12].

Considering an evolutionary development panorama of technologies in the Brazilian Nursing, we perceive that the mediation of teaching and learning is an increasing trend in the education of undergraduates and in the health education of the clientele[14].

The Plataforma PEnsinar® was built according with a sociological and historical perspective. Our presupposition is that culture must be incorporated by the individual throughout a historical process, with the aid of a mediation by its pairs. However, such mediation is held with more experience and ability, thus promoting an interaction, which becomes the primary tool of all development[15].

We expect that this educational technology improves the learning of the nursing process and classifications. In addition, we look for the involvement of students in this process, which can be achieved by interactive classes, discussions of problems/clinical case studies, questions, problem-based learning and online education[4-5].

The provision of didactic and pedagogical tools in the platform will work aligned with the mediation of the professor. These tools have mechanisms to improve the learning of students and consecutively encourage the development of the ZPD, contributing to the transmission of knowledge on the nursing process and classifications[6-7].

A study carried out in 2012 with nursing students evaluated a software and proved the benefits that educational technology provides to the learning. The research verified the diagnostic accuracy using the Nanda International taxonomy, in which 96.2% of students considered the software great, very good or good[16].

In this sense, the Virtual Learning Environment (VLE) is used as an instrument of mediation, since it gathers tools that promote greater autonomy of the student. In addition, contrary to the traditional way, these tools provide better use of the theoretical contents, making them more attractive, while also allowing access in different places and times[17].

A research group in Ribeirão Preto (SP) developed educational materials and software programs for students and health professionals. They created a more attractive and stimulating teaching-learning process by facilitating the clearing up of doubts and making learning more innovative[14].

Studies that evaluated educational technologies demonstrated that their interfaces provided a pleasant and motivating study environment. Tools (sounds, images and texts) were used to simulate the reality of a work environment, as well as allowed the access to information in a quick and secure manner[18].

The Plataforma PEnsinar® will allow the possibility of inserting and editing the proposed nursing classifications and the didactic and pedagogical tools. This resource will be offered for the construction and facility of the learning of the NP steps, as well as for the updated release of classifications for elaboration of diagnoses, outcomes and interventions, through data bases from books, texts, explanatory contents, examples and media.

The interactivity and facility of access and consultation to bibliographies and contents outstand as important factors in the optimization of time. On the evaluation of a digital tool and a hypermedia for the teaching practice in nursing, the time of learning was optimized because the access to the contents was facilitated, becoming an agile, flexible and interesting activity[19-21].

With the possibility of storing, recovering and organizing information by the internet, as well as monitoring the actions of students, the VLE will allow greater creativity, dynamicity, interaction and communication in the educational process[22-23].

The professor area consists of the options of insertion and edition of a clinical case. This clinical case aims at offering data that will stimulate students to have clinical reasoning and critical thinking. It will provide the identification of problems, causes and evidences, which are requirements to make decisions and construct the NP steps[24].

The interactive process named education mediation occurs in this scenery: the professor follows the development of the students' actions and will correct, evaluate, orientate, comment, signalize, alert and validate each action of students in the construction of the NP steps[22].

To evaluate two technologies, were considered relevant the tools that made available a resource that allowed the exchange of

messages between professor and student. For them, an environment to exchange messages related to the studied content enriches the VLE on the performance of the teaching-learning process[20,25]. This mediation will provide a better relationship between students and professors because it propitiates a new manner of interactivity in the everyday life of the nursing teaching. Its result will be the active participation of students, awakening the ability of reflection and problematization which is intrinsic to the NP[26].

An active role of the student results in a greater independence in the construction of knowledge through the decentralization of the professor. The VLE is an instrument of mediation that favors the process in which the professor has the role of advisor, collaborating in this construction with his/her experience, methodologies and previous knowledge[27].

The student area will have the option of choosing the nursing diagnoses, results and interventions of the NP, with access to the data base with the classifications of Nanda International, NOC, NIC or ICNP®. These classifications are the most known and used in the educational process, research, practice and management of Brazilian Nursing[28-31].

Continuing to the construction of the NP, the students will come across the phases. In their structure, the modules will have: assessment (clinical case and data collection instrument); nursing diagnose; planning (priorities, outcomes and interventions); implementation and evaluation[32].

These areas of the platform have tools aimed at the teaching and construction of the NP, which will improve the observation of phenomena pertinent to the area. We also aim the improvement of the relationship with elements intrinsic to the nursing practice, i.e., elements related to the decision-making (interventions) based on judgement (diagnoses) to achieve the desired clinical outcomes. In turn, all this process depends on and stimulates the abilities of clinical reasoning and critical thinking, orientating these elements of the nursing process and practice. The use of this reasoning becomes an essential ability for nurses and nursing students[1,4-5].

The development of these methodological fundaments anchored in an educational technology will enhance creativity and critical thinking. This enhance will happen because it will ensure the insertion of classifications as part of the basis of knowledge available to the students and of tools that permit a better choice of nursing diagnoses, interventions and outcomes. We presuppose that its use will promote and stimulate critical thinking, and therefore boost the permanent education of professionals, teaching of NP, as well as decision-making[32-34].

Pedagogical methods and resources which favor creativity with the aid of educational technologies, as the Plataforma PEnsinar®, are part of a roster of strategies suggested to the education and health institutions for the improvement of clinical reasoning and critical thinking. For this reason, that its use is recommended, because it aims at enhancing the learning process of the nursing process and classifications, making this process more dynamic, creative and meaningful[4-5].

Despite the few studies that evaluated clinical reasoning and critical thinking, a review of the scope over strategies for promotion and stimulus in the undergraduate education in nursing observed that the learning educational tools and technologies and the virtual and clinical environments simulated were successful. Moreover, we suggest that new pedagogical proposals are idealized, aiming to strengthen new experiences of learning which promote critical thinking among students[35].

The Plataforma PEnsinar® collaborates with the teaching and realization of the NP in Brazil because it follows the resolution no. 358/2009 of the Brazilian Federal Nursing Council (COFEN – *Conselho Federal de Enfermagem*), which has the Systematization of Nursing Care (SAE – *Sistematização da Assistência em Enfermagem*) in public and private institutions, using the NP steps of data collection (assessment), diagnoses, planning, implementation and evaluation[36].

We hope that this educational technology assists in the development of theoretical and practical abilities in the sense of improving the relationship between students and professors. The major goal is to increasingly turn the students into autonomous subjects in their learning and thus stimulate their capacity of creativity, their reflexive spirit, their responsibility, their clinical reasoning and their critical thinking[30].

After conclusion of the construction, we continued to the transition phase. In this moment, the system built by the development team was properly working in a real operational environment and was transferred for users that will use the software. After an evaluation process, the software will be incremented with a feedback, informing defects and necessary changes[8-9].

Users accessing the system will subsequently culminate in an evaluation of the functional performance, by using the Evaluation Process Model, according to the standard ISO 9126-1, which will evaluate the characteristics such as functionality, reliability, usability and efficiency[8-9].

Study limitations

We can describe the difficulty of enlisting researchers and students of the technological area that have interest in educational- and health-related projects. This, together with the availability of few resources, delayed the project, which made impossible the evaluation of the platform after its use, as initially planned.

Contributions to the field of nursing, health, or public policies

The Plataforma PEnsinar® is a potential initiative to fulfill the need of a virtual technology aimed at teaching the NP. However, the most important is the possibility of achieving its major purpose, which is to transform the current situation of nursing education, as well as the use of the nursing process and classifications, directly impacting on the quality of the care of institutions for individuals, families and communities.

We expect that this initiative awakens other researchers to propagate transforming ideas that build new technologies and pedagogical resources for the paradigmatic change we desire.

CONCLUSION

This study aimed to describe the construction and transition phases of the Plataforma PEnsinar®, a VLE for using the NP and the nursing classifications.

The interfaces of the Plataforma PEnsinar® (administrator area, professor area, student area and NP construction area) were

made, interconnected and tested in the construction phase. The administrator area permits the registering of nursing classifications, users and contents of didactic and pedagogical tools. The professor area has the possibility of constructing cases and inserting students into them. After this, the subsequent stage is to choose the Module Nanda-I/NOC/NIC or the Module ICNP®, progressing to the learning of NP steps, with the use of nursing classifications for its construction. Explanations, examples, videos, audios and chat were made available, with the aim of facilitating the understanding of the nursing steps and classifications.

After finishing the construction phase, the transition of the Plataforma PEnsinar® was conducted by the development team for researchers, which allowed the employment of the tool. The access the systems by users will later culminate in an evaluation of the functional performance.

In the course of the Plataforma PEnsinar® development, we highlighted the interaction between technological, educational and health areas. Such interdisciplinarity aimed at building a technology which collaborated with the practical insertion of new educational and healthcare models, which counteract the traditional models dominating the education and healthcare institution.

Each structure, mechanisms and tools of the platform achieve the theoretical presuppositions of Lev Vygotsky because they intended on establishing better learning relationships between students and professors, aiming to enhance the ZPD by living and sharing experiences of their sociocultural contexts, thus providing the construction of knowledge.

Given this context of development, we aim the transformation of the role of these actors, making the student an active agent inside the learning process. The student, previously a mere receptor, turns into the responsible for his/her own construction of knowledge, with the aid of the mediation of the professor and the didactic and pedagogical tools.

FUNDING

This study was fomented by the Ministry of Science, Technology, Innovation and Communication (MCTI – *Ministério da Ciência, Tecnologia e Inovação*) and the Brazilian National Council for Scientific and Technological Development (CNPq), through the Universal Call MCTI/CNPq no. 14/2012.

ACKNOWLEDGMENTS

We thank the Coordination for the Improvement of Higher Education Personnel (Capes) for allowing one of the authors to complete the Inter-University Exchange program in Portugal; as well as the researchers of the Nursing Research & Development Unit (ui&de), Lisbon, Portugal, and the Centre for Information Systems Research and Development (CIDESI), Porto, Portugal, for having welcomed the author during this period.

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