

# Development of a course in the Virtual Learning Environment on the ICNP<sup>®</sup>

Desenvolvimento de um curso no Ambiente Virtual de Aprendizagem sobre a CIPE<sup>®</sup>

Carolina Costa Valcanti Avelino<sup>1</sup>

Fernanda Ribeiro Borges<sup>1</sup>

Camila Mitiko Inagaki<sup>2</sup>

Marcos de Abreu Nery<sup>1</sup>

Sueli Leiko Takamatsu Goyatá<sup>1</sup>

## Keywords

Nursing informatics; Educational technology; Education, distance; Education, nursing; Education, nursing, continuing

## Descritores

Informática em enfermagem; Tecnologia educacional; Educação a distância; Educação em enfermagem; Educação continuada em enfermagem

## Submitted

October 19, 2015

## Accepted

February 15, 2016

## Corresponding author

Carolina Costa Valcanti Avelino  
Gabriel Monteiro da Silva street, 714,  
37130-000, Alfenas, MG, Brazil.  
ccv89@yahoo.com.br

## DOI

<http://dx.doi.org/10.1590/1982-0194201600010>



## Abstract

**Objective:** To develop and evaluate a course on a Moodle Platform on diagnoses, interventions, and nursing outcomes according to the International Classification for Nursing Practice.

**Methods:** A quantitative, descriptive, cross-sectional study conducted with 51 nursing students and practicing nurses. The course evaluation was done using a COLLES Survey. A multiple linear regression model was used to analyze the variables.

**Results:** The course was developed in accordance with the instructional objectives defined using various technological resources: activities map, coffee with prose forum, virtual library, personalized teaching support material, discussion forum, Wiki, and animation video. There were significant associations among four COLLES Survey sub-items and the variables images, Wiki resource, time available for the activities, and group.

**Conclusion:** The proposal for creating this course proved to be effective and consistent for innovation in vocational training and continuing education in nursing.

## Resumo

**Objetivo:** Desenvolver e avaliar um curso na Plataforma *Moodle* sobre diagnósticos, intervenções e resultados de enfermagem, de acordo com a Classificação Internacional para Práticas de Enfermagem.

**Métodos:** Estudo quantitativo, descritivo, de corte transversal realizado com 51 graduandos de enfermagem e profissionais enfermeiros. A avaliação do curso foi realizada por meio do Inquérito *COLLES*. Utilizou-se o modelo de regressão linear múltipla para análise das variáveis.

**Resultados:** O curso foi desenvolvido de acordo com os objetivos instrucionais definidos, utilizando diversos recursos tecnológicos: mapa de atividades, fórum café com prosa, biblioteca virtual, material de apoio didático personalizado, fórum de discussão, *Wiki* e o vídeo de animação. Houve associações significativas entre quatro subitens do Inquérito *COLLES* e as variáveis imagens, recurso *Wiki*, tempo disponibilizado para as atividades e grupo.

**Conclusão:** A proposta de criação desse curso mostrou-se efetiva e consistente para a inovação na formação profissional e educação permanente em enfermagem.

<sup>1</sup>Universidade Federal de Alfenas, Alfenas, MG, Brazil.

<sup>2</sup>Universidade Federal de Pelotas, São Paulo, SP, Brazil.

**Conflicts of interest:** there are no conflicts of interest to declare.

## Introduction

Using information technology for learning in nursing has intensified recently. New technological possibilities are being incorporated into teaching practices, especially in initiatives with universities, whether to support the classroom teaching or for developing distance activities.<sup>(1)</sup> Furthermore, the Brazilian government is investing in distance learning by using new technologies as a way to raise the teaching quality standard in the country.<sup>(2)</sup>

In this context, it is the role of higher education institutions to create opportunities for learning mediated by computer technology and the use of the internet. These changes, which occur at a national and international level, have required the development of new pedagogical and educational methodologies, especially in nursing.<sup>(3)</sup>

A study conducted in São Paulo with the objective to identify the cognitive and social skills developed by graduate students of the discipline Didactic-Pedagogical Training in Health, through the Moodle platform, showed that students processed and problematized information in the form of thoughts and knowledge built from the collective dimension of learning. It also showed that 81% of participants had no previous experience with Moodle. However, the students felt like they had a positive experience and considered Moodle to be a friendly environment that promotes collaborative learning. The positive points they brought up were the possibility of accessing different didactic materials, continuous editing and revising of the messages posted, spatial and time flexibility, exchange of information made easy, coupled with the possibility to interact with different people.<sup>(4)</sup>

Thus, the development of courses in the Virtual Learning Environment should be planned beforehand and based on methodologies and educational theories, using different technological resources that enable motivating, interactive, and reflective learning.<sup>(5)</sup>

The option to use the Moodle platform is justified because it is a Virtual Learning Environment that can be used for free, and also because of the

possibility of incorporating various technological and media resources to process information.<sup>(6)</sup>

The decision to use the International Classification for Nursing Practice (ICNP®) is also justified since this nursing classification is little known and used in the clinical practice of nurses.<sup>(7)</sup> Furthermore, there is resistance on the part of nurses to work with methods that lead to clinical reasoning, which in most cases occurs due to the lack of knowledge of these methodologies.<sup>(8)</sup>

This study was aimed to develop and evaluate a course in the Virtual Learning Environment using the Moodle platform on diagnoses, interventions, and nursing outcomes according to ICNP®, directed to training nursing students and for the continuing education of practicing nurses.

## Methods

A quantitative, descriptive, cross-sectional study was conducted at the School of Nursing of the Federal University of Alfenas with 51 participants, divided into two groups (25 nursing students and 26 practicing nurses) aged 19 to 55 years old. The study was carried out in two stages. The first stage was the development of a course on the Moodle Platform on diagnoses, interventions, and nursing outcomes according to the ICNP®. The second stage was the evaluation of this course by the participants.

The process of developing the course took place in four phases: analysis, design and development, implementation, and evaluation. The contextualized instructional design model was adopted to carry out these stages.<sup>(9)</sup> In this model the development process phases do not occur in a linear fashion; rather, these phases are carried out recursively throughout the entire process, making the selection of the educational objects and technological resources more flexible and accessible.<sup>(9)</sup> Because of this, even if the course has already started, it is possible to make the necessary adjustments in accordance with the needs of the students and educational objectives. Below are the actions presented for each phase according to Filatro.<sup>(9)</sup>

In the analysis phase the learning needs are identified and the instructional objectives defined according to the learner's characteristics and to the economic, human resources, administrative, technical, and time constraints that are raised for the course.

The design and development phase involves the production and adaptation stage of the didactic and digital resources, which means building the course's design through the Virtual Learning Environment. It is in this stage that the planning of the instruction takes place and the production of the educational materials, which determined the degree of interaction between the students and the professor, the interactivity provided by the technological capabilities of the Virtual Learning Environment, and the level of technical support and from the tutor.

In the implementation phase, the students are trained to use the technological resources developed, which is when they get used to the Virtual Learning Environment and when teaching-learning is carried out when the social organization of learning, the form of evaluation, and the feedback given by the professor are checked.

In the evaluation phase, a review is made of the problems detected, of the errors that can be corrected, and to what extent the instructional design can be improved. At this stage, 51 participants were selected through simple random sampling to evaluate the Virtual Learning Environment in relation to its visual formatting, access to the Moodle Platform, to the web browsing, as well as the hypertext and images.

The course's evaluation was also done by means of the COLLES Survey, which is a questionnaire that is validated and available on the Moodle Platform. For statistical analysis, we used the program Statistical Package for Social Sciences, version 17.0. The internal consistency analysis of the set of items in the COLLES Survey for the study was given a Cronbach's alpha of 0.87, demonstrating significant internal consistency.

The multiple linear regression model was used to explain the relationship between the independent variables and the dependent variables of the

COLLES Survey. Significance was set at 10% for the regression model's parameters.

The study was registered in Brazil under the Platform Presentation of Certificate number to Ethics Assessment (CAEE) 30802714.8.0000.5142.

## Results

The development phase consisted in defining the course's instructional objective with the use of technologies for the dissemination of knowledge about the ICNP® for the professional practice. As for the course's sequence, it was decided to provide the structure of the Virtual Learning Environment in stages according to the Contextualized Instructional Design Model to make it easier for the student on the platform and the evaluation of all the stages.

Next, the resources and the media to be used were defined: activities map, coffee with prose forum, virtual library, personalized teaching support material, discussion forum, Wiki, and animation video.

- Activities map: this was a resource used for the students to gain a view of the course as a whole, such as the themes of the units, specification of the activities and the period to carry them out, description of the assessments, and information about the classroom times together. It was developed in Google Drive using a "Google Presentation" tool in the form of slides and made available on the Moodle Platform. It should be pointed out that the course's resources were made available on the map in the form of a link so as to make it easier for the students to access the activities.
- Coffee with prose forum: this was the medium of communication of the tutors with the students and for feedback about the activities developed.
- Virtual Library: this was the place where all the support material was made available to the student, and it could be downloaded.
- Teaching support material: it was produced by the authors and evaluated by a post-doctorate professor with experience in this subject. All

suggestions were considered and the final version was converted to a PDF format and made available on the virtual library so that the students could download them. It was also made available on the Virtual Learning Environment in the format of a virtual book to encourage reading. A free Digital Publishing Platform that does this conversion was used (Figure 1).

- Discussion Forum: this took on the form of questions and answers and was intended to encourage discussion and interaction among participants based on the teaching support material and further reading. The topic of discussion was “Getting to know the stages of the nursing process and using the ICNP®.”
- Wiki: this was a feature of the Moodle Platform that made it possible to build collaborative texts, which means that the text editing was not done by only one author, but by many, whether students or professors, all of whom participat-

ed in the teaching-learning process. Three Wiki resources were built on the platform. On Wiki 1, a fictitious case study was prepared directed to chronic conditions, which was evaluated by three experts with experience in the subject. The items evaluated were clarity, readability, content, and changing of items. In this activity, the questions were directed toward building the students’ clinical reasoning without specifying any type of nursing classification in order to evaluate their knowledge on the subject. On Wiki 2 the Arc Method proposed by Charles Maguerez was used as a pedagogical strategy for the troubleshooting stages (questioning). This method was applied by the reasoning process of diagnoses, interventions, and nursing outcomes according to the ICNP®. This way, based on the observation of the reality of clinical nursing practice, problem situations were identified such as case studies raised at the clin-

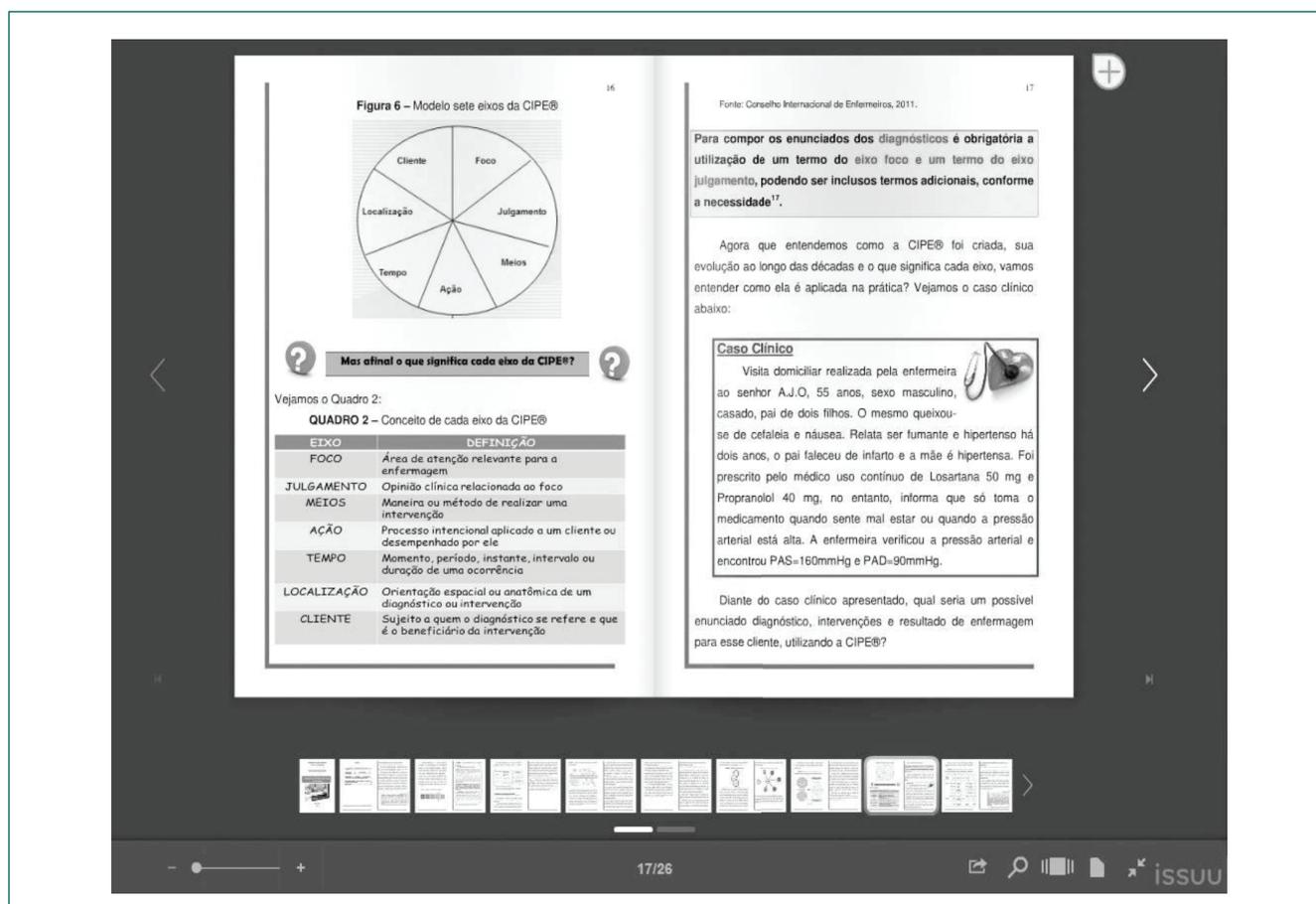


Figure 1. Teaching support material in a virtual book format

ic, at home, among other areas. Data collection was performed from the case study raised. After this, a careful, critical, and reflective analysis of the client's case was carried out, identifying the relevant data (key points), which were grouped and submitted to theoretical analysis (theorizing). This phase, which corresponded to clustered relevant data, needed to be compared to the normal standards or explanatory theories of the factors related to the occurrence of the injury. The hypotheses of solutions by the Maguerez method corresponded to hypotheses of nursing diagnoses established by the ICNP®. Finally, the application to reality corresponded to the implementation of the nursing process through interventions and outcomes for the client. On Wiki 3 a case study was prepared in the form of an animated video. The production of the animated video included the following steps: preparation and examination of the case study, writing of the script, preparation of the storyboard, and development of a short video. This case study was drawn from reality and adapted for educational purposes. It was then evaluated by three doctor experts with experience in prenatal care, childbirth, and postpartum care, which were the subjects addressed in this case. The items evaluated were clarity, readability, content, and changing of items. The final case study was turned into a script and reviewed by an animation designer with an academic background in cinema animation. This script was based on a prenatal nursing check-up at a Family Health Unit of a pregnant woman with social problems. The characters were the nurse, the receptionist, the pregnant woman, and her baby. In the third stage, a storyboard was drawn up by the same professional who reviewed the script. The storyboard is the tool used as a first viewing of a short or long video, which is required for the production of a film and is used from its preparation all the way to the showing. In the last stage, the animated video was finally developed by the same designer. The animated film was intended to give "life" or movement to the drawings, photos, objects, cutouts, and

puppets through computer animation. In the process, the actors only added their voice as narrators or by dubbing characters. The animated video was entitled *Case Study: a pregnant woman at a prenatal consultation at a family health unit* and featured three actors to narrate the characters. The length of the video was 5 minutes and 58 seconds (Figure 2).

After the end of building the course on the Moodle Platform, an evaluation was done by 51 participants, which showed that almost all the participants succeeded in all the aspects evaluated. When asked about the educational objectives proposed by the survey, 96.1% considered the visual formatting of the page to be appropriate, 100% considered access to the Moodle Platform page and to the hypertext as appropriate, and 98% considered the internet browsing and images appropriate.

According to the multiple linear regression model, 10 to 25% of the variance in the sub-items of the COLLES Survey was explained by the models adjusted with the independent variables (Table 1).

Significant associations occurred to explain the behavior of four sub-items on the COLLES Survey (relevance, critical reflection, support from tutors, and support from peers), which had the following independent variables involved: appropriateness of images, using the Wiki resource, time available for doing the activities, and group.

The mean scores of the answers to the sub-item "relevance" increased for those who considered the images of the Virtual Learning Environment and the use of the Wiki resource as very adequate for the educational objectives. The mean scores of the answers to the sub-item "critical thinking" increased for those who considered using the Wiki resource as very adequate for the educational objectives. For the sub-item "support from tutors," the mean scores of the answers decreased for time, which means that the more the time was appropriate to carry out the activities, the lower the need for support from tutors was; and it increased for those who considered the Wiki resource as very adequate. For the sub-item "support from peers," the mean scores of the answers was higher for the group of professionals.



Figure 2. Animation video

Table 1. Distribution of the sub-items on the COLLES Survey and other variables studied according to the estimate of the parameters of the multiple linear regression models

Variables	Relevance		Critical reflection		Support from tutors		Support from peers	
	B	p-value	B	p-value	B	p-value	B	p-value
Interceptor	8.486	0.000	9.583	0.000	12.667	0.000	10	0.000
Images	4.917	0.008	-	-	-	-	-	-
Wiki	1.171	0.016	1.783	0.004	1.509	0.009	-	-
Time	-	-	-	-	-0.856	0.040	-	-
Group	-	-	-	-	-	-	2.385	0.019
R <sup>2</sup>	0.255	-	0.155	-	0.173	-	0.107	-

B - estimate of the parameters that make up the model

## Discussion

Despite the course being developed on the Moodle Platform and the educational materials used being highly rated by the participants and validated by the linear regression modeling, a limiting factor for its realization was the financial investment made available for developing virtual learning objects such as the animation video. This may hinder the democratic access of nursing students and healthcare professionals to new educational technologies, espe-

cially in public higher education institutions where there is neither technical staff nor budget funds for such activities.

The development of virtual environments for education should be planned beforehand and based on educational principles that allow a dialogical learning and that contribute to the formation of opinions and reflections by the learners. Because of this, the most important stages for the development of a distance learning course are: setting objectives, producing adequate teaching materials, and building an efficient

and organized script. Furthermore, a well-planned and friendly Virtual Learning Environment must contain various technological resources as an educational strategy and be dynamic, while also allowing necessary adjustments and adaptations.<sup>(5,9)</sup>

The study carried out at a public university that aimed to evaluate the Virtual Learning Environment in the teaching of the nursing process to students of the discipline Basic Fundamentals of Nursing I revealed the importance of a previous planning of this discipline, whose educational objectives were achieved: 95.2% considered the format and the hypertexts adequate, 92.9% considered the navigation to be adequate, 100% considered the access adequate, and 97.6 considered the images adequate.<sup>(3)</sup>

As for the digital teaching support material, it is different from printed material due to the possibility of using different media. Therefore, the construction of the digital teaching material should consider technical, graphic, and pedagogical aspects with support from appropriate equipment and software. However, human support is essential, from qualified professionals for the area that material needs to be created for, in accordance with the purpose of learning, since the use of technology by technology is insufficient to devise a new educational concept.<sup>(10)</sup>

The animated video simulating a clinical situation was an innovative and different approach from those to which the participants were used to. The use of resources that simulate common situations of professional nursing practice is essential to the process of teaching and learning about skills, abilities, and decision making by nurses.<sup>(5)</sup> Furthermore, the learning styles of the students should be considered when proposing a course because each one has a different way of processing information, of reasoning, and of solving problems. Some prefer concrete facts and data while others process better visual information such as videos, images, and diagrams, while still others prefer written forms. Knowing these different forms of learning contributes to the planning and allocation of resources in order to achieve the educational objectives that distance education will target. The competence of professors in the choice

of methods and resources to be used depends in most cases on knowing how to balance these different styles.<sup>(11)</sup>

Therefore, it is necessary to select technological resources that are adequate to the educational objectives proposed for developing a discipline or a course. The results show that among the resources available on the Moodle Platform, Wiki is certainly one of the most applicable to higher education for training nursing students and for the continuing education of practicing nurses and it serves as an important resource toward building collaborative knowledge. Wiki can facilitate the creation, planning, and development of clinical case studies, which favors building the critical and reflexive view of students.<sup>(12)</sup>

## Conclusion

The quantitative assessments done by the participants made it possible to conclude that the course developed on the Moodle Platform from a contextualized instructional design provided a more friendly, motivating, and interactive environment for the process of training nursing students and for the continuing education of practicing nurses. Among the resources used were Wiki, which has important characteristics such as the possibility of building a collaborative text, inclusion of active methodologies, and different media tools. Thus, it can be said that the objective proposed for this study was successfully achieved because the course developed was considered an effective and consistent technological strategy since it allowed access to information and built knowledge about the ICNP®.

## Acknowledgements

We would like to thank the Coordination for the Improvement of Higher Education Personnel for the financial support of a *stricto sensu* graduate scholarship, for a master's degree in nursing.

## Collaborations

Avelino CCV and Goyatá SLT collaborated in the design stages of the study, analysis, data interpreta-

tion, writing of the article, critical review on the intellectual content, and final approval of the version to be published. Inagaki CM, Nery MA, and Borges FR declare to have contributed with writing the article and doing a critical review of the intellectual content and final approval of the version to be published.

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