



Semiotics and semiology of the preterm newborn: evaluation of an educational software application*

Semiotécnica e semiologia do recém-nascido pré-termo: avaliação de um software educacional

Semiotecnia y semiología del recién nacido pre-término: evaluación de un software educativo

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ABSTRACT

Objective: Evaluate the educational software application Semiotics and semiology of the preterm newborn. **Methods:** The layout and content evaluation of the application was performed with the participation of three information technology specialists, two audiovisual specialists and eleven nurses (professors and healthcare nurses). **Results:** Most of the items evaluated in the application received good and very good concepts from over 70% of the evaluators, and were therefore deemed adequate for layout and content. **Final Considerations:** We consider that the software is adequate for use in nursing education about the semiotics and semiology of the preterm newborn.

Keywords: Neonatal nursing; Physical examination; Educational technology

RESUMO

Objetivo: Avaliar o software educacional Semiotécnica e semiologia do recém-nascido pré-termo. **Métodos:** A avaliação de conteúdo e aparência do software foi feita com a participação de três especialistas em informática, dois em audiovisual e onze enfermeiros (docentes e enfermeiros assistenciais). **Resultados:** A grande maioria dos itens avaliados no software recebeu conceitos bom e muito bom de mais de 70% dos avaliadores, sendo portanto adequados na aparência e conteúdo. **Considerações Finais:** Consideramos o software adequado para ser utilizado no ensino de enfermagem sobre a semiotécnica e semiologia do recém-nascido pré-termo.

Descritores: Enfermagem neonatal; Exame físico; Tecnologia educacional

RESUMEN

Objetivo: Evaluar el software educativo Semiotecnia y semiología del recién nacido pre término. **Métodos:** La evaluación del contenido y apariencia del software se realizó con la participación de tres especialistas en informática, de los cuales dos en audiovisual, y once enfermeros (docentes y enfermeros asistenciales). **Resultados:** La gran mayoría de los ítems evaluados en el software recibió conceptos de bueno y muy bueno por más del 70% de los evaluadores, siendo por tanto adecuados en la apariencia y contenido. **Consideraciones Finales:** Consideramos el software como adecuado para ser utilizado en la enseñanza de enfermería sobre la semiotecnia y semiología del recién nacido pre-término.

Descriptorios: Enfermería neonatal; Examen físico; Tecnología educacional

* Part of the doctoral dissertation named *Semiotics and semiology of the preterm newborn: development and validation of an educational software application*, presented at Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo - USP, a WHO collaborating centre for nursing research development. Project funded by CAPES, FAPESP and CNPq.

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INTRODUCTION

Technological resources applied to nursing information technologies are fundamental for quick information access and knowledge construction and updating⁽¹⁾. One of the main advantages of Nursing education is the fact that it promotes up-to-date nursing care experiences outside clinical facilities, enabling students to better prepare themselves for the moment of interaction in real-time, promoting the integration between theory and practice⁽²⁾.

In our experience of monitoring nursing undergraduate students during theoretical-practical activities, they express that, when faced with the preterm newborn, they feel insecurity, anxiety and fear of handling the baby, because the moments when they were in contact with this population segment in the hospital environment were rare. Therefore, for several students, the first interaction with the preterm newborn happens during clinical evaluation practice, when they are faced with a wide range of details and doubts to be clarified due to new situations and, at the same time, with the issue of some preterms' clinical stability. Even clinically stable babies should not be excessively stimulated or exposed to the environment for longer than necessary, due to risks incurred by loss of body heat and clinical alterations. Some of them, especially, are in a minimal handling protocol.

In this perspective, the avoidance of theoretical-practical education in semiotics and semiology and students' individual performance of this procedure lead to excessive manipulation and, therefore, additional stress for the preterm. We consider that it is fundamental for the student and the professional to have prior opportunities to practice clinical evaluation before performing it directly on the baby.

Still, considering that learning about this content is hampered by the inexistence of innovations that provide a quick and efficient link between theoretical and practical knowledge, we developed the educational software application named Semiotics and semiology of the preterm newborn, based on Paulo Freire's pedagogic reference framework of problematization and Bernard's software development methodology⁽³⁾.

The application uses advanced, computerized and interactive technology, with multimedia resources like photographs, figures, videos and sound. The content was organized in four parts: presentation, semiotics, semiology and simulations, besides presenting links, gallery, references and technical records.

Regarding copyright, we requested an ISBN number to Fundação Biblioteca Nacional. The project's ISBN# is 978-85-86862-19-9.

Motivated to make adequate educational material available to users, we developed the present study to evaluate the content and layout of the application

Semiotics and semiology of the preterm newborn, involving IT, audiovisual and nursing specialists.

METHODS

This is a descriptive-exploratory study.

We selected 16 participants who met the inclusion criteria: five years or more working in their professional areas, or a title of specialist. Five professionals were selected from the IT area (two IT technicians and three audiovisual technicians), and 11 nurses (five neonatal and pediatric nursing, nursing semiology and nursing information technology professors, and six healthcare nurses from neonatal and pediatric units).

In order to evaluate the software, we elaborated three different instruments for the IT, audiovisual and nursing professionals, based on other studies related to educational applications⁽⁴⁻⁶⁾. One of these studies proposed a division of the instrument in four dimensions⁽⁵⁾, to which we assigned the participants: 1 – evaluation of the minimum performance of the response time (IT technicians), 2- pedagogic dimension, including the content of the application (nurses); 3- evaluation of the interface quality and the aesthetic and audiovisual adequacy (nurses, IT and audiovisual technicians); and 4 – adequacy of the application and the simulations (nurses).

At the conclusion of each item and topics/subjects in the three instruments, the participants had the opportunity to voice their comments and suggestions.

The instruments included the summative method, a Likert-style scale⁽⁷⁾. In the software evaluation, the established options were poor, average, good and very good. An item was considered adequate when 70% or more evaluators attributed good or very good ratings to it.

The project was submitted to and approved by the Review Board of Escola de Enfermagem de Ribeirão Preto/USP, protocol #0334/2003, with the participants signing the respective term of consent.

RESULTS

The item "time of response" was evaluated by all the participants from the IT area, who attributed good and very good concepts to all sub-items (Figure 1).

The CD-ROM performed adequately on the different computers used by the evaluators, with clear and efficient navigation buttons, without problems with response times.

Regarding quality of the interface, it was more frequently (60%) evaluated as average or poor for the sub-items visual aspects and navigation buttons, and as good and very good for usage of space and screen layout by 60% of the evaluators (Figure 2).

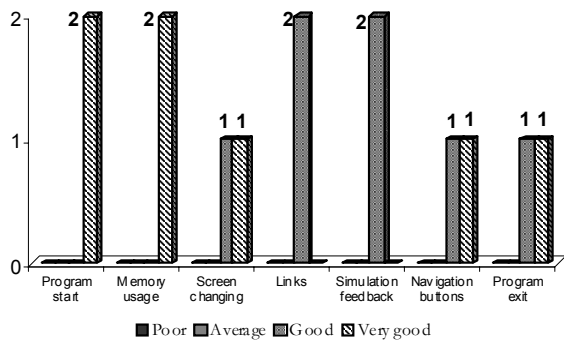


Figure 1 – Results of the evaluation of the time of response for the specific educational application by two IT professionals

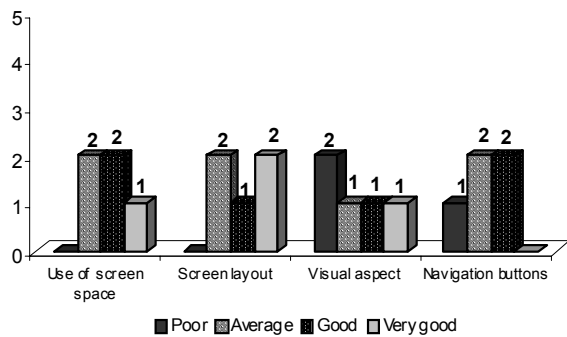


Figure 2 – Results of the evaluation of the quality of the interface of the educational software by five IT and audiovisual professionals

Comments and suggestions: About the use of the screen space, some of the screens overshadow others; as for the visual aspect of the interface, the theme was considered “heavy” due to the use of cool colors, and some screens had texts with different fonts and line spacing; there could also be more “forward/back” buttons on the screens (Figure 3).

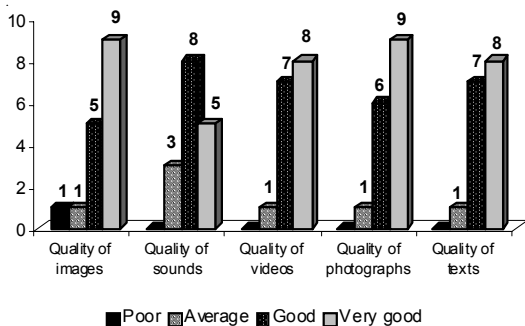


Figure 3 – Results of the evaluations of the aesthetic and audiovisual adequacy of the educational software by all 16 professionals

Comments and suggestions: low sounds. Even with the audio controls set to maximum output, the sounds were not clear. Rales and hissing were also accompanied by background voices, and these should be filtered. However, another comment was that the pulmonary sounds greatly enhance the comprehension of the text and, as a suggestion, sounds of heart and abdominal auscultation could also be included.

The adequacy of the application was validated, since over 70% rated it as good or very good, reaching 81.8% for the sub-items ease of execution and program exit, and 100% for program start, presentation of usage instructions and the media bank (Figure 3).

Comments and suggestions: In the start menu, the program starts with the “welcome” title screen, and it is necessary to click the “Start” button to activate the menus, which was considered non-intuitive.



Figure 4 – Results of the evaluation of the educational application by 11 nurses

The quality of the simulations was adequate; the sub-item feedback to the responses was rated as good and very good by 80% of the evaluators; the sub-items presentation and wording obtained the same ratings by 90% and the association with the content was adequate for 100% of the participants (Figure 5). One of them did not respond to this item.

Comments and suggestion: About the presentation of the simulations, the respondents suggested that there could be an initial page with orientations, and that the questions should be presented according to the logical sequence of the content, which was stated to be more learner-friendly. The evaluators also noted that, when the user clicks the “exit” icon, the phrase “Do you really wish to exit the program?” is inadequate. The simulations were said to be excellent and rich, with movies, figures and photographs.

The content was evaluated by 11 nurses, sub-divided in 20 aspects of the software, so that they could be evaluated individually.

The content topics 100% of the participants evaluated as good or very good were: the goal; the systematic clinical evaluation; circulation, eating and hydration, elimination,

tissue integrity, rest and sleep, sexuality, and sensorial, psychosocial and psycho-spiritual necessities.

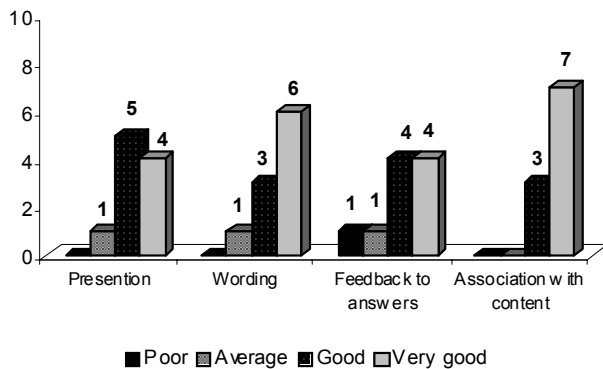


Figure 5 – Evaluation of the quality of the educational software simulations by 18 nurses

Comments and suggestions: The respondents suggested the insertion of a photograph of the precordial bulge, like the excellent photograph of the edema, and they also observed that the definitions and charts were good; the need for eating and hydration was considered excellent and well-developed, with a wealth of information, particularly on inspection. The content for the necessity of elimination was very dense, even though it was deemed important, as well as the insertion of pictures of genitourinary anomalies; more pictures of skin injuries should be added to the necessity of tissue integrity; and the necessity of sensorial perception was rich in images and content, suggesting photographs and videos about the reflexes. Also, the evaluators found the visual and audio contents were very good.

The topics of the presentation content, justification, semiotics, semiology, clinical evaluation context, evaluation at birth, transition evaluation, oxygenation and thermoregulation necessities were rated as good and very good in most sub-items, by 100% of the participants. Some sub-items were rated as either good or very good by 90.9% of the evaluators.

Comments and suggestions: For clinical evaluation, the explanation was considered too textual, although it contained important and significant content. Suggestions included increasing the number of screens and inserting photographs of all the materials used for evaluation; inserting photographs of hypospadias, epispadias and ambiguous genitalia. Also, it was said that it was not possible to go back from the “evaluation at birth” screen to the “definition and history” and “context” screens; pulmonary hypertension, a video showing nasal flaring and moaning sounds should be added for the necessity of oxygenation.

DISCUSSION

We believe in the importance of the participation of

users and specialists in the evaluation of educational applications, which was made explicit in other studies⁽⁴⁻⁶⁾.

Therefore, for the evaluation of the content and layout of the developed software, we prioritized the participation of nurses, in addition to IT and audiovisual professionals. Although the educational application had been planned for undergraduate nursing students and teachers, to support the teaching-learning process, it can also be used for permanent education of nurses, as well as other healthcare professionals.

With the introduction of computers in the healthcare area, it was necessary to include technology-related courses in the undergraduate and graduate curricula. With the increasing demand for the qualification of nurses to use information technology in the nursing area, Universidade Federal de São Paulo created the Information Technology Specialization Nursing Program in 1999⁽⁸⁾.

Similar to other professionals, nurses need to use computer resources to enhance productivity and quality, so that they can aggregate and analyze the relevant information for decision-making and for the efficient performance of all their functions⁽⁹⁾.

For interface quality, the interface layout should allow for intuitive navigation and interaction, besides encouraging discovery and exploration. An adequate interface offers the user comprehension of the program area being currently used and why, feeling that he is in control⁽¹⁰⁾.

As for the chosen color scheme, our reference was an author who recommends the use of neutral colors for the background, since they improve visibility⁽¹¹⁾, and another who suggests using colors with a varied spectrum, such as red and blue to indicate change in depth for titles and text⁽¹²⁾. We did not change the background, title and text colors, but we changed the black color of the screen borders to a lighter color, making them more comfortable to look at.

About the aesthetic and audiovisual adequacy, it is considered that the use of interactive multimedia to teach semiology in nursing courses favors the student in the necessary information exchange, and is added to classical resources like books, journals and even classes, constituting a group with an immense educational advantage⁽¹³⁾.

Sound has an important motivational function, making the learning situation more realistic⁽¹⁴⁾.

We had difficulties to obtain technology that would make it possible to capture body auscultation sounds in order to improve the user’s learning experience.

About the videos, one of the nurses said that even better quality could be achieved if they had a voice track explaining the process.

In educational applications, the integration of animations and sound (visual and audio media) is more

effective than animation with text (visual media only)⁽¹⁵⁾.

In educational applications, the use of different types of media is frequent, because they work by improving comprehension about some type of content⁽¹⁶⁾.

Starting the program is quick and easy, since there is no need for installation. It is auto-executable, unlike other applications, such as the physical exam of the term newborn, which requires installation.

About the program's adequacy, the left-side and right-side menus allow the user to freely navigate through the software, in a non-linear, flexible structure. We believe that the possibility of letting the users free to browse as they please increases their interest and encourages learning. The structure of applications about adults⁽¹³⁾ and term newborns⁽⁴⁾ physical exams is more rigid. In the latter, the user has to go through a module, do the exercises and they can only go to the next module if they score 70% in the tests.

The format in which the content is distributed influences browsing, and adequate browsing will allow the users to navigate freely through the program, having better access to the contents⁽¹⁶⁾.

The program's start-up screen was revised, since it was not considered intuitive. The user must click on the central image to start the program. On the other hand, if the user does not meet this interaction demand, the program will perform it automatically after 15 seconds.

The exit phrase of the simulations was changed, and the questions were still presented at random, since there is no rigid content sequence for the user to follow.

The programmer made the corrections so as to permit going back from the "evaluation at birth" screen to the "definition and history" and "context" screens. That allows the user to browse freely.

The project's final review and the software adequacy were done, according to most of the reported suggestions which, added to the "good" and "very good" ratings of more than 70% the users, allows us to consider that the educational software "Semiotics and semiology of the preterm newborn" has adequate contents and layout.

An exception was the item "quality of the interface", which was rated lower than the established standard for this concept. However, all the technical problems presented in the software were corrected, and a large share of the evaluators' suggestions was incorporated into the application. Aspects like the addition of other videos, images, photographs and an audio track will be incorporated in the next issue of the educational application.

We consider that this software can contribute to education in neonatal nursing, as well as to growth and self-development of the student's knowledge of the procedures, besides making traditional classes more

dynamic, encouraging the students' active participation in knowledge building. Software can contribute for the technological advancement of neonatal nursing⁽⁴⁾, and information technology contributes as the support in nursing activities and patient care⁽¹⁷⁾.

FINAL CONSIDERATIONS

This educational instrument makes it possible to innovate the studied content with the use of information technology resources and active methodologies, favoring the teaching-learning process and conferring individual characteristics to the learning process.

We consider that this software allows the professors and students to experience the inter-relation between four trends: the semiotics and semiology content of the preterm newborn, new educational insights, technological innovations in education and the use of the first phase of the Nursing Process, organizing the content in Basic Human Necessities.

Several educational applications for the education of future nurses have been developed, with increasingly better resources and performance, since the authors are interested in providing a high-quality product to the final user. For that, they try to use the available technology as well as they can, attempting to adequate the users' expectations and their own to the quick changes and innovations in the IT area. A large share of the responsibility of having an adequate final product belongs to the evaluator, and this has been guaranteed by the effective participation of the users in the evaluation of the developed applications.

The study limitation comprises the low amount of evaluators, but we believe that this did not put the final quality of the product at risk, in view of the results obtained and the incorporation of most suggestions in the final version of the software. We think that it is important to evaluate this software with the final user – the nursing student, a project that is designed to happen at a later stage.

With the positive evaluation of the CD-ROM, it can be made available to the educational and healthcare institutions, and even on the Internet. It is an instrument with interactive multimedia resources and interactive simulations between the users and the system, broadening the access to a large amount of information (texts, sound, static and animated images), promoting learning (permanent education for nurses) about the semiotics and semiology of the preterm newborn. This high-risk share of the population accounts for 7% of births in Brazil, receiving care in neonatal units, basic and district healthcare units and also at home.

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