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### REFERÊNCIA

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# User assessment of a digital learning environment

Avaliação de um ambiente digital de aprendizagem pelo usuário

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## Keywords

Pediatric nursing; Education, nursing; Nursing education research; Computer-assisted instruction; Breast feeding

## Descritores

Enfermagem pediátrica; Educação em enfermagem; Pesquisa em educação de enfermagem; Instrução por computador; Aleitamento materno

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## Abstract

**Objective:** To assess the digital learning environment “Breastfeeding of Premature Infants” from users’ perspective.

**Method:** Descriptive and cross-sectional study with quantitative data analysis; sample of 30 mothers of hospitalized premature infants at a neonatal unit in the Brazilian Southeast to assess the users’ impression in general and about the contents of the digital environment.

**Results:** The criteria “good” and “excellent” for the general impression (visual, user friendliness and navigability) and contents (independent learning and breastfeeding) of the digital learning environment reached the expected agreement level (superior to 70%).

**Conclusion:** The users considered the digital environment “Breastfeeding of Premature Infants” easy to use, informative and important to support the mothers of premature infants with breastfeeding aspects.

## Resumo

**Objetivo:** Avaliar o ambiente digital de aprendizagem “Aleitamento Materno do Prematuro” sob a perspectiva do usuário.

**Método:** Estudo descritivo, transversal com análise quantitativa de dados; amostra composta por 30 mães de prematuros hospitalizados em uma unidade neonatal do Sudeste do País para a avaliação da impressão geral e do conteúdo do ambiente digital.

**Resultados:** Os critérios “bom” e “ótimo” relativos a impressão geral (visual, facilidade de uso e navegabilidade) e conteúdo (aprendizagem sem auxílio e aleitamento materno) do ambiente digital de aprendizagem atingiram a concordância esperada (acima de 70%).

**Conclusão:** O ambiente digital “Aleitamento Materno do Prematuro” foi considerado pelos usuários de fácil uso, informativo e importante para apoiar a mãe do prematuro nos aspectos relacionados ao aleitamento materno.

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## Introduction

In case of premature birth, the parents and family should receive support and orientation, including, among others, information to establish and maintain breastfeeding. Breastfeeding is a primordial element for the health and survival of the child, particularly of premature infants, because of its immunological properties, besides its importance in mother-child bonding. The incidence rate of successful breastfeeding for premature infants is low though, mainly at high-risk neonatal units, where weaning often takes place before discharge. A recent study identified that the most frequent causes of early weaning were related to educational factors, including lack of information and orientation.<sup>(1)</sup>

In an integrative review to encourage reflections about the importance of health education for relatives of premature infants and professionals working at neonatal units showed that educative materials can contribute in this teaching process.<sup>(2)</sup>

Believing in the value of educative material, in health care and education, one can also use the computer as an additional resources to orient families of hospitalized premature infants, as well as to prepare them for discharge.<sup>(3)</sup>

The expansion of the Internet and its relative democratization around the world are well-known, as a resource that facilitates communication and education in several social contexts.<sup>(4)</sup>

The possibilities the Internet offers include distance education, which the Ministries of Health and Education consider as a permanent education initiative.

Distance education has also been widespread in nursing, demonstrating the great possibilities this resource offers to teach care. On the other hand, to put distance education courses in practice, digital learning environments need to be used. These environments allow users to have contact with the contents and participate in activities, in a synchronous or asynchronous manner, provided that they have Internet access.

Various meanings exist for digital learning environments. In this study, they are defined as computer systems, available on the Internet, which

permit the development of the teaching-learning process, in which information can be presented in different forms.<sup>(5)</sup>

Technological advances induce motivation for the development and introduction of new technologies in health education and teaching, such as digital learning environments, with a focus on care delivery to premature infants and their family.<sup>(6, 7)</sup>

Through the progressive incorporation of new technologies and resources, according to the educational needs of society, educational approaches can be developed and applied through the Internet, enriching the teaching-learning process.

It is not just necessary to incorporate knowledge inherent in the area though, but also to seek and deepen substantiated concepts about the development and evaluation of educational technologies.<sup>(8)</sup>

The assessment of digital learning environments can help to orient their better use and enhance their quality, by means of formative assessment throughout their development process.<sup>(6)</sup>

Based on the development of a learning environment about breastfeeding for premature infants, it was questioned how the mothers of hospitalized premature infants would assess this educational technological resource.

It should be highlighted that the digital learning environment “Breastfeeding for Premature Infants”, presented here, results from a doctoral dissertation, in which the environment was constructed and validated, involving nursing and informatics experts. The learning environment was constructed based on the website development model “User Centered Design”, which intends to guarantee creative potential, is rich in visually attractive and user-friendly resources that are useful for the target population,<sup>(7)</sup> in this case mothers and family members of premature infants. The product is considered innovative because it addresses breastfeeding aspects, ranging from the period when the infant is not apt yet to suck at the breast, when milk production is maintained through milking, until breastfeeding at home. These contents are addressed interactively, in language that is easy to understand, including multimedia resources and simulations.

The present study is aimed at assessing the learning environment “Breastfeeding for Premature Infants” from a user perspective.

## Methods

A descriptive and cross-sectional study with quantitative data analysis was undertaken between November 2011 and January 2012 at a neonatal unit in the Brazilian Southeast. Based on a convenience sample, the sole selection criterion adopted was the inclusion of mothers of premature infants hospitalized at the neonatal unit, who demonstrated the desire to breastfeed their child and accessed the digital environment. As an exclusion criterion, the contraindication of breastfeeding was used, due to maternal or neonatal factors. Thirty-four mothers of premature infants were invited, but four of them did not accept to participate in the study, totaling a sample of 30 participants. The users were contacted at the neonatal unit at different times, were invited to participate and, if they accepted, the research team scheduled a convenient time for data collection. As regards the premature infants, all of them, of different postnatal ages, were at the unit for at least two days, so as to guarantee the mothers' inclusion at distinct times in the breastfeeding process.

It should be emphasized that, in studies about the assessment of digital learning environment, no probabilistic samples have been used, but populations with defined characteristics and a convenience sample. Convenience sampling is appropriate and frequently used to generate ideas in exploratory studies. Intentional samples are selected at the researcher's judgment and are widely used when one wants to assess the opinion of specific groups about a certain problem or hypothesis.<sup>(9)</sup>

Although the digital learning environment in this study was constructed for availability on the Internet, the user assessment process was off line, due to difficulties to access the network at the neonatal unit, which could make the assessment impossible, besides their preference to access it while staying with their child at the unit. Therefore, to

collect the data, a notebook was made available to the users, on which the digital environment had been installed. To reduce the study bias, the research team contacted the users at different times (between eight a.m. and six p.m.), at an appropriate time for data collection, and interfered neither in the navigation through the digital environment, nor in the completion of the questionnaire, unless help were requested.

Considering that the assessment was done by end users of the digital learning environment, the decision was made to assess criteria related to impressions about the educational resource and the contents addressed. Thus, two questionnaires were elaborated (1 – general impression with six items; 2 – contents with three items), based on another study developed in Brazil.<sup>(6)</sup> A pilot test was developed with four users, so as to check the appropriateness of the terms for the study population. After free navigation in the learning environment, the users marked the concepts very bad, bad, regular, good or excellent. In addition, suggestions or comments could be expressed verbally or registered in the questionnaire.

Descriptive statistics were used, with simple frequency distribution in absolute and relative values, central trend and dispersion measures, included in an electronic worksheet (Excel 2007<sup>®</sup>), validated through double data entry, exported and analyzed in Epi-Info software, version 3.5.3. The digital learning environment was considered appropriate if at least 70% of the users attributed the concept good or excellent to each instrument item, in accordance with the criterion adopted in other studies.<sup>(6,8)</sup>

The study development complied with Brazilian and international ethical standards for research involving human beings.

## Results

The users' mean age was 24.6 years (SD 5.7 years), and the mean education 9.1 years (SD 3.2 years). As regards the infants, the mean gestational age at birth was 32.4 weeks (SD 3.1 weeks), with a mean

weight at birth of 1,709 grams (SD 569.4 grams). Data in table 1 present the characteristics.

**Table 1.** Sociodemographic characteristics of mothers of premature infants hospitalized at a neonatal unit

Characteristics	n(%)
Origin	
Ribeirão Preto	10(33.3)
Other cities	20(66.7)
Marital Status	
Single	06(20.0)
Married	15(50.0)
Others	09(30.0)
Work	
No	17(56.7)
Yes	13(43.3)
Delivery type	
Normal	15(50.0)
Cesarean	15(50.0)

Out of thirty users who participated in the study, 18 (60.0%) affirmed they knew how to use a computer, 12 (40.0%) did not and five of them needed help for navigation. The mean navigation time in the digital learning environment was 28.1 minutes (SD 10.8).

Data in table 2 demonstrate the users' assessment in terms of general impression; table 3 shows the data for the content assessment.

Most users (76.7%) described learning as a positive aspect in the assessment, as they considered that "...the site is very clear and user-friendly...".

As regards the content of the environment, one user considered the images and texts appropriately illustrated, facilitating the understanding of the contents. Another fact one user referred was that the site should be made available some time before birth, so as to solve doubts and help the mothers.

Some comments and suggestions were made though, which will be incorporated into the new version of the digital environment. One user suggested making the homepage more attractive, with better illustrations, and another questioned the difficulty to answer the educative games.

**Table 2.** Users' general impression about the digital learning environment "Breastfeeding for Premature Infants"

Criteria	Very bad n(%)	Bad n(%)	Regular n(%)	Good n(%)	Excellent n(%)
The visual is pleasant				8(26.7)	21(73.3)
User-friendly	1(3.3)		3(10.0)	5(16.7)	21(70.0)
Shows immediate return			1(3.3)	8(26.7)	21(70.0)
Permits independent navigation	1(3.3)	1(3.3)	5(16.7)	2(6.7)	21(70.0)
Permits choosing what you want to learn about breastfeeding				7(23.3)	23(76.7)
Would recommend the site to friends/relatives				4(13.3)	26(86.7)

**Table 3.** Users' assessment about the contents of the digital learning environment "Breastfeeding for Premature Infants"

Criteria	Very bad n(%)	Bad n(%)	Regular n(%)	Good n(%)	Excellent n(%)
Provides independent learning	1(3.3)	2(6.7)	2(6.7)	6(20.0)	19(63.3)
Permits learning about breastfeeding for premature infants				6(20.0)	24(80.0)
It would be interesting to have a site with other themes related to premature infants		1(3.3)	1(3.3)	6(20.0)	22(73.4)

## Discussion

The users of the virtual learning environment positively assessed all items addressed and considered

that the technology could facilitate information gaining about breastfeeding.

The study limitation referent to the sample should be highlighted, as the participants were predisposed to breastfeeding, a fact that could positively interfere in the assessment. Nevertheless, a convenience sample was chosen, as the mothers are the end users of the digital environment in the perspective of information and knowledge acquisition to start and maintain breastfeeding.

The use of information in nursing teaching, particularly learning environments, has become more intense in recent years, mainly at teaching and research centers, including the clear need to involve users in assessment to put this technological resource in practice.<sup>(9)</sup>

As regards the visual presentation of the environment, although one user referred to the colors, suggesting the use of more attractive shades, clearer shades are recommended for the background, especially monochromatic colors, which enhance the visibility of other shades and facilitate reading.<sup>(10)</sup>

The estimated navigation time in the learning environment is two hours, although the participants used about a quarter of the estimated time. This fact could be justified by the short time the mothers had available for navigation, considering that, at the place where the assessment took place, the neonatal unit, despite the above described care the research team took, many professionals and family members move around, with the presence of noisy equipment and countless procedures and events that attract the users' attention during navigation. Therefore, computer technology is considered a valuable resource for information acquisition, but may not lead to increased knowledge if used separately, as learning is a complex process.<sup>(11)</sup>

Although 12 users affirmed they did not know how to use the computer, seven did not need help for navigating. This finding may be associated with data from the National Household Survey supplement, which reveal increased Internet access. Hence, even if they users had little opportunity to actually use the computer, the equipment and its handling are not totally unknown.<sup>(12)</sup>

As all users said they would recommend the technology to friends and relatives, demonstrating satisfac-

tion with the digital environment, it is inferred that these mothers may positively disseminate this tool, evidencing the contributions of similar resources in the teaching and learning process in health and nursing.<sup>(13)</sup>

This study contributes as the digital learning environment joints three main moments<sup>(14)</sup> in care delivery to premature infants and families in a single educational tool: the first after birth, when the infant is not apt to breastfeed yet, when milking is needed and the mother's preparation to breastfeed; the second when breastfeeding starts, when the professional's presence is fundamental to help and solve doubts and questions, and the third upon discharge, when doubts, questions and insecurity on how to maintain breastfeeding at home emerge. In this sense, one participant referred that she could have benefitted from this information, evidencing this resource's contribution.

The actions health professionals need to perform to direct care need to be based on the infants and families' needs, with a view to comprehensive care delivery at neonatal intensive care units.<sup>(15)</sup> Hence, the digital learning environment can be incorporated into clinical practice at the neonatal unit after suggestions to make the homepage more attractive and adapt the games have been attended to.

Depending on the way it is used, the site can be considered an auxiliary technology in health education actions direct at the mothers and family members of premature infants, contributing to the teaching-learning process about breastfeeding. However, although the users considered it appropriate, further research with larger samples is needed, representative of other neonatal care realities. In view of the complexity of developing learning environments, the assessment process of a digital environment is fundamental, aiming for the end users' satisfaction.<sup>(6)</sup>

The development and assessment of educational technologies with a community focus can be a promising area for further research, without forgetting about the humanization of nursing care though.

## Conclusion

The users considered the environment "Breastfeeding of premature infants" easy to use, informative

and important and all items reached the expected agreement levels (superior to 70%).

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## Contributions

Vasconcelos MGL; Góes FSN and Scochi CGS declare that they contributed to the conception and project, data analysis and interpretation; Writing of the paper, relevant critical review of the intellectual contents and final approval of the version for publication. Fonseca LMM and Ribeiro LM contributed to data analysis and interpretation; relevant critical review of the intellectual contents and final approval of the version for publication.

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