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Original article

Mobile application for first-time parents - newborn care: an experience report

Aplicativo móvel para pais de primeira viagem - cuidados ao recém-nascido: relato de experiência

Aplicación móvil para padres primerizos - cuidado del recién nacido: relato de experiencia

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Abstract

Objective: to report the trajectory of an educational technology production on newborn care for first-time parents in the format of a mobile application. **Method:** this is an experience report from January to October 2019, carried out at the Laboratory of Educational Technologies of a state public university in northern Brazil. **Results:** an integrative literature review was carried out, obtaining eight articles and the corpus was processed in the IRAMUTEQ software, which generated five classes. Based on the results of the integrative review, the application production was developed, meeting the functionality, usability, reliability, efficiency, maintainability and portability requirements. **Conclusion:** the experience of producing an educational technology based on scientific evidence and on a systems model, in the format of a mobile application, will provide the target audience of parents with access to updated and scientific content about safe care for newborns.
Descriptors: Infant, Newborn; Nursing; Health Education; Educational Technology; Mobile Applications

Resumo

Objetivo: relatar a trajetória da produção de uma tecnologia educacional sobre cuidados ao recém-nascido para pais de primeira viagem no formato de aplicativo para dispositivo móvel. **Método:** relato de experiência vivenciado em janeiro a outubro de 2019, realizado no Laboratório de Tecnologias Educacionais de uma universidade pública estadual na região Norte do Brasil. **Resultados:** elaborou-se a revisão integrativa da

literatura, obtendo-se oito artigos e o *corpus* foi processado no *software* IRAMUTEQ, que gerou cinco classes. Com base nos resultados da revisão integrativa foi desenvolvida a produção do aplicativo suprindo os requisitos de funcionalidade; usabilidade; confiabilidade; eficiência; manutenibilidade e portabilidade. **Conclusão:** a experiência de produção de uma tecnologia educacional baseada em evidências científicas e em um modelo de sistemas, no formato de um aplicativo móvel, propiciará ao público-alvo de pais o acesso aos conteúdos atualizados e científicos acerca do cuidado seguro ao recém-nascido.
Descritores: Recém-Nascido; Enfermagem; Educação em Saúde; Tecnologia Educacional; Aplicativos Móveis

Resumen

Objetivo: relatar la trayectoria de producción de una tecnología educativa sobre el cuidado del recién nacido para padres primerizos en forma de aplicación para dispositivo móvil. **Método:** relato de experiencia de enero a octubre de 2019, realizado en el Laboratorio de Tecnologías Educativas de una universidad pública estatal de la región Norte de Brasil. **Resultados:** se realizó una revisión integrativa de la literatura, obteniendo ocho artículos y el corpus fue procesado en el software IRAMUTEQ, que generó cinco clases. Con base en los resultados de la revisión integradora, se desarrolló la producción de la aplicación, cumpliendo con los requisitos de funcionalidad, usabilidad, confiabilidad, eficiencia, mantenibilidad y portabilidad. **Conclusión:** la experiencia de producir una tecnología educativa basada en evidencia científica y modelo de sistemas, en formato de aplicación móvil, permitirá que el público objetivo de los padres tenga acceso a contenidos actualizados y científicos sobre el cuidado seguro del recién nacido.
Descriptores: Recién Nacido; Enfermería; Educación en Salud; Tecnología Educacional; Aplicaciones Móviles

Introduction

The news of a pregnancy causes family realignment, creating a map of references not only for space but also for the functions of its members. Routines, time, affection and the physical environment of a family are resized. It is expected that the process of bringing newborns (NBs) home is surrounded by healthy affection, reorganization and positive restructuring.1 It is crucial to prepare mothers for hospital discharge, to reduce anxiety, increase maternal self-confidence in the home care and improvement in children's home adaptation.[2]

During the neonatal period, mothers and fathers have to adapt to the care they must provide to NBs. Although the moment of hospital discharge symbolizes a new phase, it is permeated by insecurities and doubts. No matter how qualified parents are, at home they will often be alone, with the responsibility of taking care of a child and playing their parental role. In this regard, it is necessary to grant parents autonomy in the care of NBs during the time they remain hospitalized, aiming at reducing anxiety and improving self-confidence, in order to promote their empowerment and prepare them for home care through a continuous process of health education.[3]

NBs demand care, such as skin care,[4] which involves daily hygiene practices when bathing, changing diapers and cleaning the umbilical stump. In order to clarify doubts about care practices

with the NB at home, technological innovations emerge, such as educational technologies (ET), understood as concrete processes, based on everyday experiences, aimed at the methodical development of knowledge and knowledge to be used with a specific practical purpose. Therefore, an ET contributes to generating knowledge to be shared with the target audience, and should be used as a facilitating tool in promoting humanized care, enhancing education and care guidance.5

Therefore, in order to adapt educational technology to the target audience of "first-time parents", the production of a mobile application such as ET for health education is praised, due to the popularization of mobile devices being considered by many as a revolution technology with the greatest impact today, after the revolution caused by the internet and social networks. The main characteristic of mobile devices is the breaking of the limitation of mobility, since the smartphone resembles a pocket computer, which can accompany users 24 hours a day and wherever they are, in addition to the fact that this type of device has easy access to millions of software to customize its functions, the so-called applications.[6]

Software is developed to perform specific tasks on a device. These tasks include sending messages, carrying out transactions, accessing social networks, playing music and videos, and they can go even further by integrating functionality to applications that are aware of the context in which the devices are located and identify nearby locations, calculate routes, record and share images and sounds, among other possibilities. Thus, application installation allows the customization not only of the devices to users' preferences, but also of their interaction experiences to their conveniences and needs.[7]

Considering the above, the objective is to report the trajectory of an ET production on NB care for first-time parents in the format of an application for a mobile device.

Method

This is an experience report on educational technology production. In order to meet the proposed objective, the research was organized in two steps: integrative literature review; educational technology development.

The experience took place at the Laboratory of Educational Technologies (LATED - *Laboratório de Tecnologias Educacionais*) of the Research Group on Educational Practices in Health and Care in the Amazon (PESCA), at *Escola de Enfermagem Magalhães Barata*, *Universidade do Estado do Pará* (UEPA), Belém, Brazil, between January and October 2019.

Three students participated in the production: one from high school, who developed the application's programming; another from the undergraduate nursing course, which listed the scientific knowledge on the subject; and a third student of the graduation course in architecture, who made the illustrations. Production also had the collaboration of a nursing master's student from UEPA and a professor from UEPA and a nurse from the infant care service of a public hospital. The experience's participants were the project developers and, as there was no research with human beings, the project did not require referral to the Research Ethics Committee.

The sources of information in the first step were obtained in the literature review from the search for articles in the Virtual Health Library (VHL) and National Library of Medicine (PubMed) (Step 1). Such information subsidized the mobile application production (Step 2). In the review data processing, IRAMUTEQ was used. In Brazil, this software began to be used in 2013 in research on social representations, other areas also appropriated its use, since it allows different forms of statistical analysis of texts, produced from interviews, documents, among other sources.[8]

Application production was based on the five phases of the systems development process: requirements analysis; definition of knowledge; computational representation; system coding; system assessment.[7] The contents were formatted in multiplatforms and Visual Box, Sublime Text, Kivy Library, Buildozer were used. Python language was used and, in terms of design adequacy, PowerPoint, Adobe Photoshop CC 2019, Paint 3D, Corel Draw 2019. The requirements that guided the application production were functionality, usability, reliability, efficiency, maintainability and portability.[9]

Results

First step: Integrative Literature Review

To guide the literature review, the following question was formulated: what content on basic NB care (I) do parents (P) need to have and/or access at home (Co)? Publications were identified in VHL and PubMed, using the descriptors: Newborns; Health education; Educational technology; Skin Hygiene, Infant Care and Home Nursing. For the combination of descriptors, the Boolean operator (OB) AND was used.

Full texts freely available in Portuguese or English and articles written between 2013-2018 were included. This period was determined, as the application began production in 2018, so that the publications refer to the last five years of publications that precede the start of application

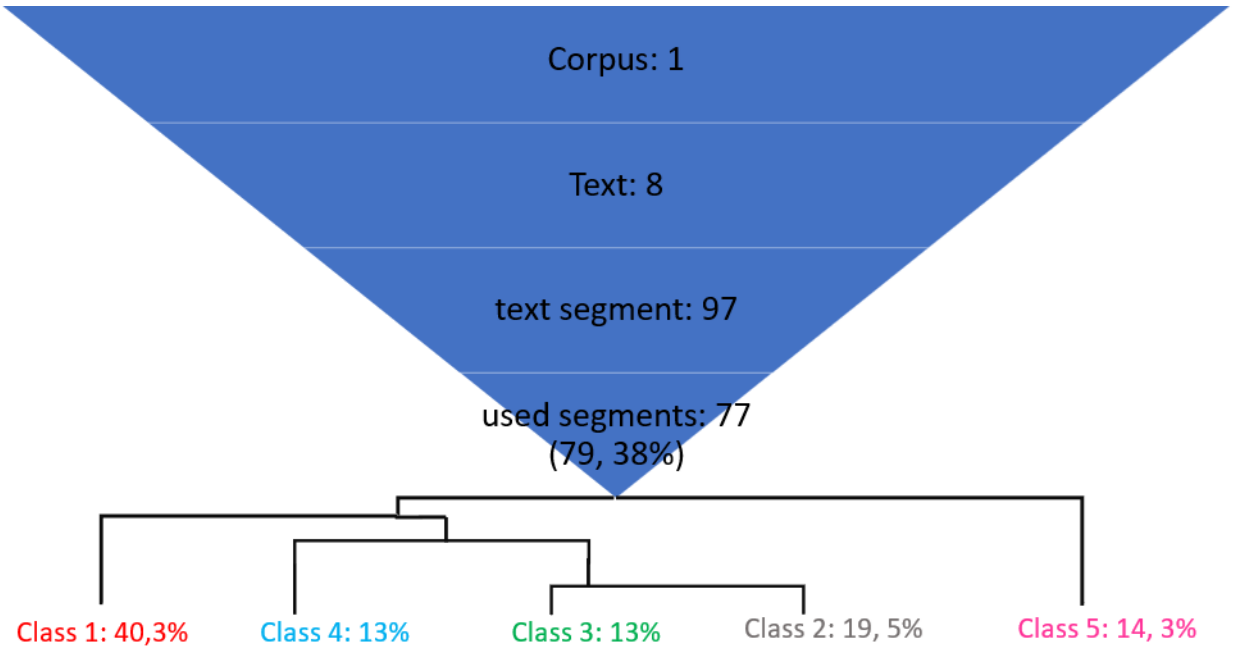
production, appropriate to the theme. First, there was a skimming reading to approximate and identify the ideas of the article, then an exhaustive and attentive reading to identify the core themes in order to answer the research question.

To record the information, a collection instrument was used with the items: title of the article; journal title; number and names of authors; authors' titles; country and language of publication; year of publication; institution in which the study was carried out; publication design; study's methodological characteristic; research objective; characteristics of the samples; performed interventions; results; conclusions. Eight articles were identified for analysis, as shown in Chart 1.

Chart 1 – Record of review step information, 2013 to 2018

Title	Publication year
Neonatal skin care: what should we do? A four-week. follow-up randomized controlled trial at Zagazig University Hospital[10]	2017
Community-made mobile videos as a mechanism for maternal, newborn and child health education in rural Uganda: a qualitative assessment[11]	2016
Effectiveness of a campaign to implement chlorhexidine use for newborns in rural Haiti[12]	2017
Current Neonatal Skin Care Practices in Four African Sites[13]	2015
Skin, thermal and umbilical cord care practices for neonates in southern, rural Zambia: a qualitative study[14]	2015
Alta hospitalar e o cuidado do recém-nascido prematuro no domicílio: vivência materna[15]	2013
Animação educativa sobre cuidados domiciliares com o prematuro[16]	2018
E-baby integridade da pele: inovação tecnológica no ensino de enfermagem neonatal baseado em evidências[17]	2018

After processing corpus 1, the Descending Hierarchical Classification (DHC) dendrogram was obtained, and 5 thematic classes were identified (Figure 1). The classes made it possible to identify the contents to compose the ET, the main objective of this first step.



Health education in neonatal care at home			Educational technology for mothers about newborn care			Benefit of using emollients to combat neonatal infection			Use of chlorhexidine in the umbilical stump X traditional methods			Use of hygiene products in the prevention of the skin in the diaper area		
word	f	X²	word	f	X²	word	f	X²	word	f	X²	word	f	X²
Health education	10	24,32	mention	5	35,83	emollient	9	60,32	umbilical stump	12	39,69	product	10	61,53
home	6	18,55	learn	5	35,83	need	4	21,25	traditional methods	7	31,83	hygiene	10	61,53
Virtual	6	32,08	teach	6	37,38	Used	3	20,91	Chlorhexi-dine	8	23,2	skin	11	48,93
student	4	25,32	educational technology	6	25,99	study	7	15,34	place	6	17,54	difference	6	32,03
			care	5	23,27				Midwife	4	17,44	use	8	28,52
			appreciate	3	20,91				campaign	4	17,44	no	9	20,81
			video	3	20,91							Dermatiti in diaper área	3	18,73
			How	8	20,57							significant	3	18,73
			mother	10	18									

Figure 1 - Descending Hierarchical Classification Dendrogram by IRAMUTEQ software analysis

Second step: application production

The results contemplate requirement analysis, which are expressed by functionality, usability, reliability, efficiency, maintainability and portability. Functionality: provide parents with knowledge about basic NB care; usability: this requirement is met by the attractive design, simple command and quick response provided by the application, which allows user interaction with the application; reliability: it was achieved in the application production process based on the availability of scientific material obtained from the literature review, which formulated the information on basic care for NBs contained in the application; efficiency: application response to commands executed by users, this response is assessed by time; maintainability: requirement conquered from the use of software that

enable interactive production, in which one can go back to the creation process to correct errors or update content; portability: this is due to the fact that, after the application is installed on users' cell phone, it is used 100% offline.

Then came the definition of knowledge that took place from the literature review. Thus, the application navigation flowchart was produced (Figures 2 and 3).

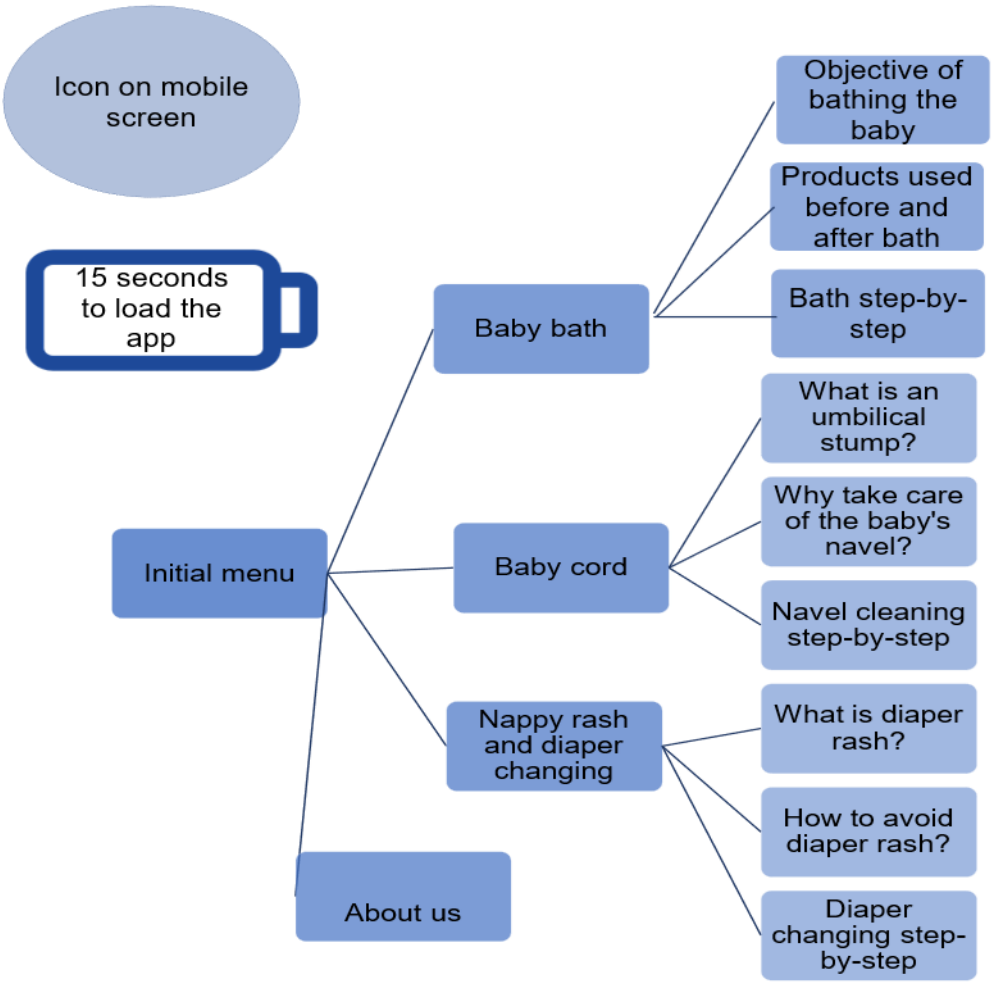


Figure 2 - "First-time parents" (*Pais de Primeira Viagem*) navigation flowchart

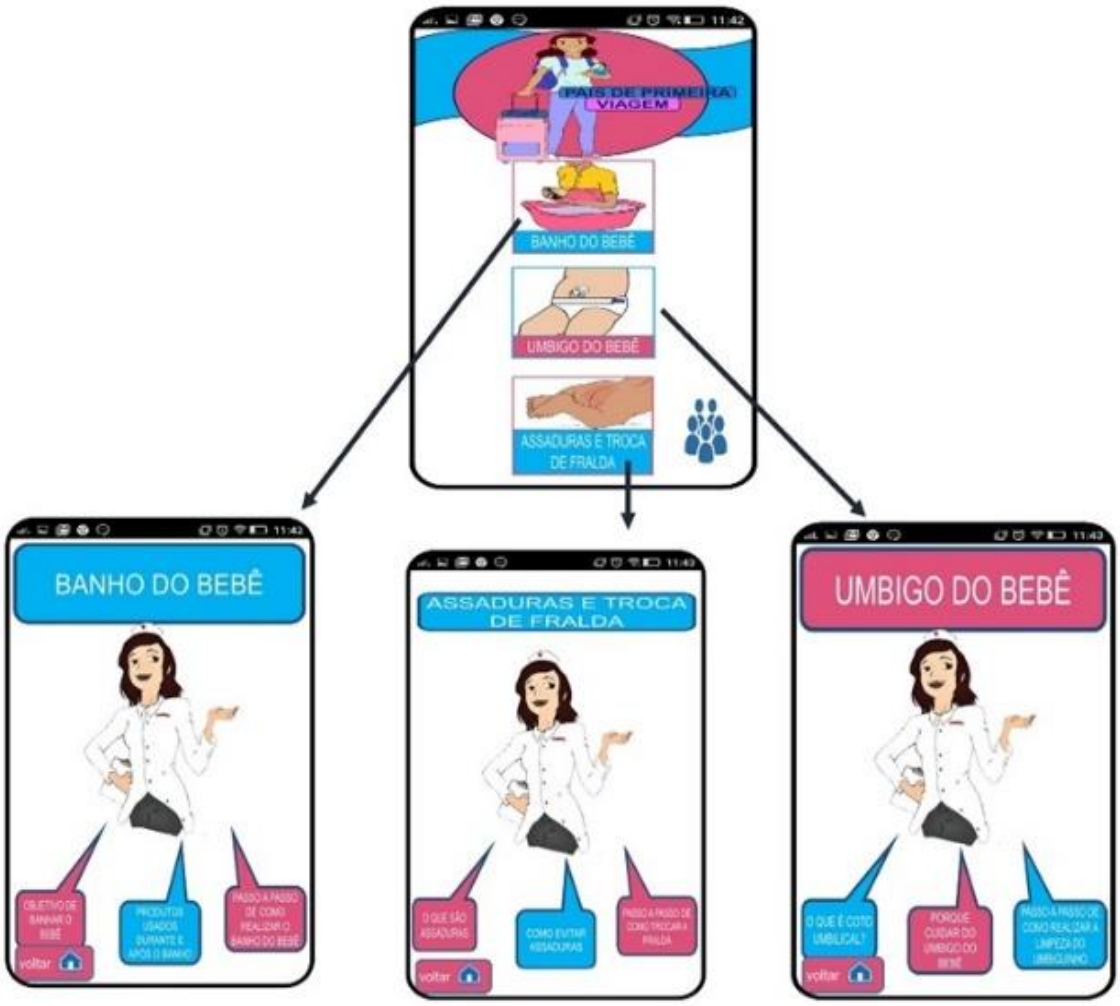


Figure 3 - "First-time parents" home menu

After the results obtained in the previous step, the computational representation was carried out, content was formatted to facilitate the encoding process in computational language embedded in the software. In this phase, the design was adapted through the use of Power Point, Adobe Photoshop CC 2019, Paint 3D, Corel Draw 2019, which contributed to layout production (Figure 4).

Figure 4 - "First-time parents" screens and layouts

Next, the system was codified using the following programs: Visual Box; Sublime Text; Kivy Library; Buildozer and Python language. This process resulted in the production of a cross-platform application tested on Windows, Linux, Android and iOS operating systems. Finally, system assessment was carried out and the application was tested on Android operating system devices, which expressed adequacy in its functioning.

Discussion

The classes point to care considered basic, such as bathing, body hygiene, the use of oils to moisturize the skin, the use of ointments and changing positions.[18] It is emphasized that care integrates the human beings' existence and is essential for healthy growth and development throughout these phases and in all steps of the life cycle. In this regard, NBs find themselves inserted in a step of life that is completely dependent on care, in which mothers and fathers assume an

important role in this whole process, including hygiene-related care routines in NB care, such as bathing, changing clothes, diaper and umbilical stump cleaning.[19]

Postpartum infections remain the main cause of neonatal morbidity and mortality worldwide. Umbilical stump can be a gateway for invasive pathogenic bacteria, since after birth, the devitalized stump is an ideal substrate for bacterial growth, in addition to providing direct access to infants' bloodstream.[20] Ratifies the importance of carrying out adequate care with the umbilical stump, in order to prevent compromises to NBs' health.

Proper care and good hygiene of normal mature neonatal skin is essential to maintain the skin's barrier function and overall health. This is achieved by optimizing the epidermal barrier integrity, which includes bathing and using emollient, preventing and managing skin infections and injuries, minimizing transepidermal water loss (TEWL), minimizing heat loss, and percutaneous absorption of toxins.[10]

The educational strategies work as a support for parents in relation to carrying out the care of the child, thus promoting the leading role, mainly the maternal one.[21] The production of an application for health education in the context of care provided to NBs will help parents to gain knowledge and improve the practice of caring for their children, promoting the health of these babies.

It is essential to train parents to provide care autonomously, promoting positive parenting, which requires effective strategies for health promotion, which implies the implementation by nurses of a health education plan.[4] Strategies mediated by technologies can provide parents with autonomy in the care of their children. The usefulness of applications in this context is highlighted, given that they are mobile and can be easily applied, and professionals can use them to interact with their clients and thus favor the access and sharing of information online, in addition to contributing to health care effectiveness.[22]

With regard to the application's contents, the evidence-based production experience made it possible to insert essential aspects of basic care for NBs at home, such as bathing, umbilical cord and diaper rash. About the bath, it confers to an activity with a view to hygiene, tactile stimulation and blood circulation and the promotion of a feeling of comfort and skin protection for the prophylaxis of infections, relaxation and well-being, in addition to promoting bonding and of security.[23]

Regarding the umbilical cord, it should be noted that in many cultures, the cord is separated with non-sterile instruments, followed by the topical application of substances that can be sources of

bacterial infection.[24]

With regard to dermatitis triggered by diaper use, it should be noted that diaper rash is the most common rash observed in the diaper area caused by friction on the skin due to a wet and dirty diaper or another part of the skin.[25] Diaper dermatitis has considerably reduced after using super-absorbent disposable diapers due to their ability to retain liquids.[4] Changing diapers at intervals of 2 to 3 hours helps to minimize exposure to irritating substances, information that was contained in the application, in order to promote NBs' health mediated by ET in the health education process.[16]

In this way, the application, containing the aforementioned contents, can make the process accessible and dynamic for parents, disseminating updated and scientific knowledge about basic care for NBs. All knowledge acquired is important to ensure continuity and completeness of care for NBs at home and involve parents in care, providing guidance so that they know how to identify and act in risk situations, thus enabling increased confidence and safety in infant care.[16]

With regard to the final assessment of the experience, the team can appropriate different skills and make approaches with different knowledge. The work carried out among high school and undergraduate students with nursing professors and professionals was enriching and, at the same time, challenging, favoring exchanges and dialogue and enabling a technology production, a fact that, from an interdisciplinary and multidisciplinary perspective, was the most positive point.

As possible facilities in the process, we mention the availability of manuals and scientific articles on ways to NB care, difficulties encountered by parents, such as caring for the umbilical stump and changing diapers. Another facility is due to teamwork, in which each one contributes knowledge and skills from their respective training areas.

As a limitation, the application has not been validated and assessed, a fact that will occur in another project at the same institution. In this sense, it was not possible to make it available in the Google store for open access. In general, the experience report contributes to the area by highlighting the trajectory for the creation of an ET that, after validity and assessment, can collaborate with parents regarding basic care after hospital discharge, thus reducing risks to NBs' health. It is also noteworthy that the application produced encourages the participation of parents, enables a safe practice in care, minimizes doubts and favors learning, especially for "First-time parents". Technology can effect changes in NB care at home, favoring the establishment of an affective bond, increased self-confidence and safety in infant care.

Conclusion

The experience of producing the application "First-time parents" collaborated to expose and understand the production process of an educational technology based on the literature and on a systems model, with updated contents, in the format of a mobile application that can provide safe care to parents in NB care at home after hospital discharge. If the stipulated objectives were met, given that the experience culminated in a viable application for use.

It is noteworthy that an educational technology produced based on evidence, allows the target audience (parents) access to updated scientific content. Encouraging the safe participation of parents in care, favoring learning and promoting NBs' health. In this regard, the production of these technologies by nursing professionals should be encouraged and the reported experience can support future projects. Thus, the possibility of producing educational technologies based on scientific evidence stands out, providing safe information in relation to the theme addressed.

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