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ORIGINAL ARTICLE

# EDUCATIONAL TECHNOLOGY FOR PREVENTION AND CARE OF RESPIRATORY INFECTIONS IN DAYCARE CENTERS[1]

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## ABSTRACT

**Objective:** to describe the validation process of an educational technology in the form of a booklet on the prevention and care of respiratory infections in children at day care centers. **Method:** methodological study that used the theoretical step of Pasquali's model. Data were collected from November 2013 to March 2014 and validated using the Delphi technique, in two moments: content analysis by 11 expert judges, and face analysis by 9 day care center instructors in the municipality of Coari/Amazonas. Questionnaires were organized on a Likert scale and analyzed quantitatively. **Results:** the material proved to be statistically validated, as it presented an excellent level of agreement between expert judges (90.91%) and the target audience (99.15%), with no disagreement in the evaluations. **Conclusion:** the educational technology was considered a facilitator in the care and education process in health actions, serving as a tool to promote effective communication and helping in the proper management of children with respiratory infections.

**Keywords:** Educational Technology. Validation Studies. Nursing. Child Health. Day carecenters.

## INTRODUCTION

Day care center are institutions that offer educational services which are not limited to assistance. Their creation was closely associated with the advent of the mothers'entry in the paid workforce outside their homes started with the Industrial Revolution, and the need to assist children in their mothers' absence. Although child care in day care centers have been transformed throughout history, with the integration of care and education functions, there are two clearly distinct models: one exclusively focused on care (physical well-being and biological issues) and another focused on curricular content, called educational[1].

Educational actions addressing the prevention of acute respiratory infections (ARI) are essential for their control within these educational and childcare institutions due to the anatomical characteristics of the upper airways of children under 36 months old and the crowding in rooms during activities, which tend to increase their exposure to pathogens that cause ARI through person-to-person contact[2-3]. This can occur due to the behavior of young children, who explore things with their hands and mouth, and because of the lack of awareness on the part of caregivers about hygiene issues and technical knowledge about conducts to avoid the transmission of diseases[3].

Acute respiratory infections have been recognized as the leading cause of pediatric morbidity and the most frequent reason of search for health services worldwide. In Latin America, these diseases represent between 50% and 70% of all pediatric consultations and 30% to 60% of all hospitalizations in health services[2].

In the period from 2018 to 2020, respiratory diseases represented the main reason for hospital admissions in the public network in Brazil, in children in this age range; 726,654 cases were registered, generating a cost of more than 631 million reais[4-5].

The actions of health professionals in day care centers represent a challenge not only to

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prevent injuries, but also to increase children's health defenses. Thus, nursing knowledge and practices can contribute to the empowerment and emancipation of individuals and communities with a positive influence on the trajectory of children development, in view of the focus on care as the object of the profession[6].

In the development of primary health care measures that can reduce the prevalence of respiratory diseases, Educational Technologies (ET) stand out among health professionals, especially nursing professionals, as a tool that contributes to the strengthening of health care of the children in day care centers[3].

Nurses constantly seek new scientific knowledge in order to promote the improvement of patient care in different care settings[7] and eventually produce technologies aimed at minimizing the difficulties experienced in their daily work. Therefore, ET emerge as creative and attractive tools to support this care.

Educational technologies refer to devices to mediate teaching and learning processes, used among educators and learners, and include printed materials, such as folders, posters, booklets, manuals or handouts[8]. However, despite being considered important tools for carrying out educational work, many are not subjected to an evaluation or systematization process, a condition to could characterize them as technological productions[9] and support them as reliable and applicable[10].

The objective of this research was to describe the validation process of an educational technology of the booklet type about prevention and care of respiratory infections in children in day care centers. It is expected to collaborate with the improvement of nursing work and with programs that seek comprehensive child health care through the creation of an educational material to meet the demands of knowledge of child educators.

## MATERIALS AND METHODS

This is a methodological development study focusing on the development, validation and improvement of methodological tools and strategies, in which qualitative and quantitative data are frequently integrated[10]. The study was carried out in the period from November 2013 to March 2014. The quantitative approach of the validation of the educational technology is presented in this article.

The methodological process for validating the NT was based on the criteria established in Pasquali's model, which comprises the theory of the elaboration of instruments to measure subjective phenomena, composed of three sets of procedures: theoretical, empirical (experimental) and analytical (statistical). As the tool consisted of an educational technology and not a psychometric scale, only theoretical procedures were used[11].

The validation process considers two aspects: face and content. In the first, the target audience, the population for which the educational technology is intended, assesses its understanding[12].In the second, a group of experts judge the clarity and relevance of the content covered in the instrument. A purposeful non-probabilistic sampling was used here because there was an interest in the opinion and contribution of subjects who knew or interacted with the focal theme of the research[10].

Eight health professionals and three socio-humanistic professionals participated in the content validation process. The inclusion criteria were: title, professional experience, supervision and authorship in scientific publications in the areas of child health and public health. For the inclusion of socio-humanistic professionals, considered essential to give an opinion on language, layout and visual communication, the criteria were: titles, scientific production and time of professional experience.

In the face validation step, nine child educators (target audience) working in a day care center in the municipal education network of the municipality of Coari, state of Amazonas, were invited to participate. These educators had professional experience in child education for more than six months and had higher education or high school education.

The content of the educational technology validated in this study was selected from scientific evidence and addressed child anatomical, physiological and immunological characteristics; pathophysiology and signs and symptoms of Upper Airway Infections (UAI); control, prevention and care of children in day care centers.

The stage of data collection for validation of the booklet occurred in two phases:

Phase 1: content validation by expert judges. The judges were contacted by sending an invitation letter via email. After signing of an Informed Consent Form (ICF), the participants received the booklet (version 1) and the validation form in digital or printed format, with emphasis on 22 indicators, separated into three blocks and with space for therecord of suggestions.

Phase 2: face validation by the target audience. Child educators received the invitation personally from the researcher. Those who agreed to contribute signed an ICF, received the printed booklet (version 2) and the validation form containing 26 indicators, distributed in five blocks, and with space for the record of suggestions.

The Delphi technique was adopted in the validation stages to seek consensus among the opinions of a group of experts on the subject. Three basic conditions were considered: anonymity of respondents; statistical representation of the distribution of results; and feedback from group responses for reassessment in subsequent rounds[13].

The questionnaires were organized on a Likert scale, with the following response options: Totally Adequate (TA), Adequate (A), Partially Adequate (PA), and Inadequate (I). Data were tabulated in Microsoft Office Excel and analyzed with the aid of the Minitab Statistical Software, version 16.

In the quantitative analysis, the total responses in each block were subjected to behavioral analysis, and the arithmetic mean of the scores was calculated for each item. Then, the degree of agreement or disagreement of answers was assessed[14].

The answer options were grouped to express the degree of consensus in scores ranging from -1 to + 1, being represented as follows: TA and A (+1), when the assessment is positive; PA (0), used when it is neither positive nor negative; and I (-1), when evaluated as negative. Responses (TA + A) with values above 70% were considered as positive means, serving as a criterion to infer that the item was relevant[14].

This study met the criteria required by Resolution 466, of December 12, 2012, recommended by the National Health Council, as it was approved by the Research and Ethics Committee (REC) of the Federal University of Amazonas (UFAM), according to CAAE 22424613.0. 0000.5020) and Opinion 475.679.

## RESULTS

The panel of judges of the health area comprised six nurses, one pediatrician and one nutritionist. They had an average age of 42 years, six (75%) were of the female sex, five (62.5%) had between 16 and 30 years of experience after graduation. Four were PhD and four were masters. All worked in teaching, had been authors/supervisors in scientific research and lived in states in the North (37.5%) and Southeast regions (62.5%).

The group of judges in the socio-humanistic area was composed of a pedagogue, a social communicator and a graphic designer. All were male, with an average age of 33.6 years. Two had three years of experience after graduation and one had 29 years. The pedagogue had worked in teaching for 28 years, had a PhD with emphasis on early childhood education and had been author/supervisor in scientific research. The other professionals were specialists in the specific area of the graduation course and worked in companies in the private sector.

As for the profile of the target audience, all were women, with an average age of 40.2 years. Seven had more than 10 years of experience in early childhood education and had completed higher education, five in the Normal Superior course.

The expert judges evaluated the educational technology using an instrument with questions distributed in three blocks, considering the objective, structure, presentation and relevance of the tool.

Block 1- Objective: This block corresponds to the purposes, goals or ends to be achieved with the use of the booklet. The following items were considered: 1.1 The information/content is consistent with the needs of the public; 1.2 The information/content is important for the quality of life and/or the work of the public; 1.3 The information invites and/or encourages changes in behavior and attitude; 1.4 It can circulate in the scientific area; 1.5 It meets the objectives of

institutions that work with the target audience. In the evaluation of this block, it was found that of the 55 (100%) responses (5 items x 11 judges = 55), 38 opted for TA, 12 for A and 5 for PA, revealing a percentage of agreement (TA + A) of 90.91%. There was a recommendation to reduce or explain some of the technical terms used.

Block 2- Structure and presentation: This block corresponds to the way of presentation of the guidelines to the target audience, including general organization, structure, presentation strategy, coherence and formatting, considering whether: 2.1 The educational manual is appropriate for the target audience; 2.2 The messages are presented in a clear and objective way; 2.3 The information presented is scientifically correct; 2.4 It is appropriate to the socio-cultural level of the public; 2.5 It has a logical sequence of content; 2.6 The information is well structured in terms of concordance and spelling; 2.7 The style of the writing is appropriate to the level of knowledge of the public; 2.8 The information on the cover, back cover, summary, acknowledgments and/or presentation are consistent; 2.9 The size of the title and topics is adequate; 2.10 The illustrations are expressive and sufficient; 2.11 The material (paper/printing) is appropriate; 2.12 The number of pages is adequate. Of the total of 132 (100%) responses (12 items x 11 judges = 132), 68 (51.52%) tended to TA, 50 to A and 14 considered the booklet to be PA, revealing a percentage of agreement (TA + A) of 89.40%. In this block, they suggested repositioning topics, textual reformulations and replacements of three figures.

The modified illustrations were those on the cover, in which children with expressions of pain were replaced by expressions of happiness in the face of the children, and two others were improved, one to better express a child with earache and the other of a malnourished child.

Block 3- Relevance: This block corresponds to the characteristics that determine the degree of significance of the ET. Five items were evaluated: 3.1 The themes portray key aspects that must be reinforced; 3.2 It allows the transfer and generalization of learning to different contexts; 3.3 It proposes the construction of knowledge; 3.4 It addresses the subjects necessary for the knowledge of the target audience; 3.5 It is suitable for use by any professional who works with the target audience. Of the 55 (100%) responses (5 items x 11 judges = 55), 37 judged the educational technlogy as TA, 15 as A and 3 in PA, revealing a percentage of agreement (TA + A) of 94.55%.

Of the overall total of 242 responses, 220 (90.91%) were judged as TA and A. Thus, all items were considered valid, since the average was greater than 70%, and they received a score of "+1" in the quantitative analysis. After incorporating the recommended adjustments, the material was sent back to the judges for a second round of analysis. With no further suggestions, the educational technology went on to the second evaluation phase.

Child educators evaluated the booklet (version 2) according to the objectives, organization, writing style, appearance and motivation through questions distributed in five blocks.

Block 1- Objectives: This block refers to purposes, goals or aims that are to be achieved with the use of ET, considering three items: 1.1 It meets the objectives of the target audience; 1.2 It helps during the daily life of the target audience; 1.3 It is suitable for use by any professional who works with the target audience. Among the27 responses (3 items x 9 educators = 27), there was a percentage of agreement (TA + A) of 100%.

Block 2- Organization: This block refers to the form of presentation, including general organization, structure, presentation strategy, consistency and formatting. Seven items were considered: 2.1 The cover is attractive and indicates the content of the material; 2.2 The size of the title and the content in the topics is adequate; 2.3 The topics have a logical sequence; 2.4 There is consistency in the information on the cover, back cover, summary and presentation; 2.5 The material (paper/printing) is appropriate; 2.6 The number of pages is adequate; 2.7 The themes portray important aspects. Of the 63 responses (7 items x 9 educators = 63), 29 were TA, 33 were A and 1 was PA, revealing a percentage of agreement (AT + A) of 98.41%.

Block 3- Writing style: This block refers to the linguistic characteristics, comprehension and writing style, the following items were

considered: 3.1 The writing is in an appropriate style; 3.2 The text is interesting. The tone is friendly; 3.3 The vocabulary is accessible; 3.4 The theme of each session is associated with the corresponding text; 3.5 The text is clear; 3.6 The style of the writing corresponds to the level of knowledge of the public. The result revealed an agreement (TA + A) of 98.15%. Of the 54 responses (6 items x 9 educators = 54), 26 were TA, 27 were A and 1 was PA.

Block 4- Appearance: four items were used: 4.1 The pages or parts are organized; 4.2 The illustrations are simple; 4.3 The illustrations serve to complement the texts; 4.4 The illustrations are expressive and sufficient. Of the 36 responses (4 items x 9 educators = 36), 18 were TA and 18 were A, resulting in an agreement (TA + A) of 100%.

Block 5- Motivation: considering the material's ability to cause some impact, motivation and/or interest, the percentage of agreement (TA + A) was 100%, because of the 54 responses (6 items x 9 educators = 54) , 28 were TA and 26 were A. Six items were evaluated: 5.1 The material is appropriate for the age, sex and culture of the target audience; 5.2 The contents are presented with logic and coherence; 5.3 It invites for interaction. It suggests actions; 5.4 It addresses issues necessary in the daily routine; 5.5 It invites/instigates changes in behavior and attitude; 5.6 It proposes knowledge for the target audience.

In Phase 2, the face validation of the booklet, of the overall total of 234 responses, 232 (99.15%) considered the booklet positive (TA + A). Each item was considered relevant and applicable, as an average higher than 70% was obtained, corresponding therefore to a score "+1" in the behavioral analysis of the responses. The comments of the target audience were not intended to suggest changes or reformulations in the material in its second version.

After completing the two phases of the validation process, it was found that the booklet is adequate for the proposed objective. Figure 1 shows the cover and two pages of the material produced.

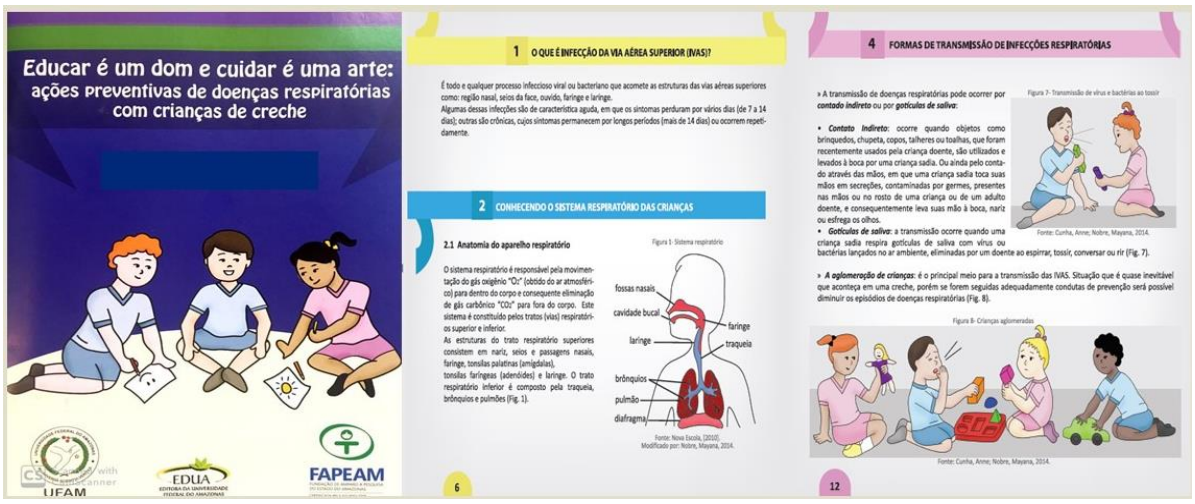


**Figure 1.** Cover and pages 6 and 12 of the booklet produced

## DISCUSSION

From 1990 to 2015, the main causes of death among children under 5 years of age in Brazil, in general, were considered preventable diseases. Among them are respiratory infections, which, despite falling from the 3rd position in 1990 to the 5th in 2015, are still among the top ten causes of death in the country[15].

Research has shown that day care has a substantially negative influence on children's health, as they are more exposed to ARI than children who stay at home, especially when known risk factors such as the size of facilities,

number of children, or hygiene policies are combined[2-3].

A study carried out in Australia pointed out that respiratory tract diseases in young children are the most common cause of consultations in general medical offices, creating a significant economic burden. The authors state that although the majority presents a mild condition and parents are advised to keep their children at home, they themselves send the children back to day carecenters due to the pressure of having to return to work[16].

Thus, it can be inferred that the educational technology can prove to be an appropriate strategy to assist in the health care of children, since it allows nursing professionals to offer the children educators material with guidance on the care and prevention of respiratory infections, allowing them to gain and deepen their knowledge, in addition to supporting decision-making.

The educational material validated in this study was considered approved in terms of its content and face, as it obtained agreement values (+1) above 70% in the two validation phases. The tool is, therefore, adequate for the objective proposed.

The suggestions of the judges alluding to the adopted language served to improve linguistic aspects. This result coincided with a scientific research that identified and characterized educational materials to guide caregivers of premature babies, in which the authors emphasized that these materials should be constructed with a language that is accessible to the public at different cultural levels[17].

Requests for modifications in the illustrations and layout of the booklet were of extreme value as they establish a balance between the message that the tool means to convey and the inserted illustrations. Therefore, the insertion of illustrations (drawings, images, photographs, symbols) and the colorful layout is extremely important for the legibility and understanding of a text, making the material inviting in the eyes ofthe public[17].

Regarding the theme addressed in this booklet and the proposal to use it in health education actions in day carecenters, the results showed that the expert judges consider it relevant.

In view of this result, it is understandable that some authors suggest that nurses need to equip themselves with consistent references to guide their practices in search of comprehensiveness, overcoming the limitations present in the different health care scenarios, because the needs of individuals, many times, go unnoticed or are reduced to demands previously established by health services[6].

In this sense, the literature has shown that the educational activities of nurses working in the Family Health Strategy have been restricted to the physical environment of the Basic Health Units and the use of educational technology mostly produced and distributed by the Ministry of Health, with themes focused on sexually transmitted disease, exclusive breastfeeding, healthy habits, hygiene, PCCU, childbirth and puerperium[18].

Combining education with care in day carecenter spaces has generated distortions in its understanding, so that there has been an overvaluation of exclusively pedagogical activities and an eglect of care actions. In this sense, it is essential to understand that care and education are intrinsically linked pillars[1]. Therefore, integrating health education in day carecenters and preschools under the supervision of nurses becomes a priority, since these professionals accumulate a wide variety of knowledge sets during their academic training that can be applied in a beneficial and effective way to child health[19].

In these places, the provision of educational services is mandatorily exercised by professionals who were trained in child education courses[18]. Studies indicate that child care is now carried out by individuals who are guided by empirical knowledge acquired from family members or even during their life experience with their own children; they lack a perspective of health promotion and quality of life for children based on scientific knowledge[20].

The suggestions of the target audience as to reformulations in the material were not many. However, it was possible to perceive, through the records on the forms, that the target audience was eager to obtain the educational material in its final version, since the theme addressed was very present in their daily work.

The validated booklet is entitled "Educating is a gift and caring is an art: preventive actions against respiratory diseases among children in day care centers. It has 26 pages, and the content is distributed in seven domains, with a list of the bibliographic references used[21]. Each section is composed of a maximum of five subtopics and the use of technical terms is limited, always accompanied by a definition of their meanings.

The content presented in ET consents with a study carried out in six nursery centers in Portugal, which found that the routine of cleaning surfaces, hygiene measures, hand contamination and the provision of care to sick children were relevant topics that should be offered in the training of child caregivers in order to prevent the spread of respiratory tract infections among children who attend these spaces[3]. Furthermore, it is necessary to develop new strategies for integrating health in early childhood education, based on actions that include prevention, promotion, protection and rehabilitation of health, both at the individual and collective level[22].

As for the presentation of the content, the booklet proved to be adequate, according to the criteria for analyzing educational materials found in the scientific literature, since the technical terms, acronyms and abbreviations used are followed by an explanation in the text, with images that help in the absorption of the content and indicating the references of the information presented, thus granting it reliability[17].

In this perspective, the educational technology validated in this study represents a relevant resource to be used by nurses in their health education actions in day carecenters, enabling a new way of caring and educating, not restricted to the physical environment of basic health units but implementing it in different places and with different audiences[18].

## CONCLUSION

This study is relevant for following a systematic and sequential process for validation of an educational technology that offers scientific material, duly validated and reliable for the prevention and care of respiratory infections among children institutionalized in day carecenters, due to their peculiarities. The validation of this tool increases the confidence among nurses and caregivers in the care and education process, valuing their work and the communication between nurses, caregivers, family and community, and also reducing school absenteeism.

Finally, the educational technology was considered a facilitator in the care and education process in health actions, serving as a tool to promote effective communication, assisting in the proper management of children with respiratory infections because it is directly related to the proposed approach.

## TECNOLOGIA EDUCATIVA NA PREVENÇÃO E CUIDADO DE INFECÇÕES RESPIRATÓRIAS NA CRECHE


## RESUMO

**Objetivo:** descrever o processo de validação de tecnologia educativa tipo cartilha sobre prevenção e cuidados de infecções respiratórias de crianças na creche. **Método:** estudo metodológico que utilizou a etapa teórica do modelo de Pasquali. Dados coletados de novembro de 2013 a março de 2014 e validados com uso da técnica de Delphi, em dois momentos: análise do conteúdo por 11 juízes especialistas e análise da aparência por 9 educadoras infantis de creche no município de Coari/Amazonas. Os questionários foram organizados em escala de Likert e analisados quantitativamente. **Resultados**: o material mostrou-se validado estatisticamente, ao apresentar um nível de concordância excelente entre os juízes *expertises* (90,91%) e o público-alvo (99,15%), não apresentando discordância nas avaliações. **Conclusão:** a tecnologia educacional tem sido considerada facilitadora no processo de cuidar e educar nas ações de saúde, servindo como ferramenta para promover a comunicação eficaz auxiliando no manejo adequado de crianças com infecções respiratórias.


**Palavras-chave:** Tecnologia educacional. Estudos de validação. Enfermagem. Saúde da criança. Creches.

## TECNOLOGÍA EDUCATIVA EN LA PREVENCIÓN Y EL CUIDADO DE INFECCIONES RESPIRATORIAS EN LA GUARDERÍA INFANTIL


## RESUMEN

**Objetivo:** describir el proceso de validación de tecnología educativa tipo cartilla sobre prevención y cuidados de infecciones respiratorias de niños en la guardería. **Método:** estudio metodológico que utilizó la etapa teórica del modelo de Pasquali. Datos recolectados de noviembre de 2013 a marzo de 2014 y validados con el uso de la técnica de Delphi, en dos momentos: análisis del contenido por 11 jueces especialistas y análisis de la apariencia por 9 educadoras infantiles de guardería en el municipio de Coari/Amazonas-Brasil. Los cuestionarios fueron organizados en escala de Likert y analizados cuantitativamente. **Resultados**: el material se mostró validado estadísticamente, al presentar un nivel de concordancia excelente entre los jueces especialistas (90,91%) y el público objetivo (99,15%), no presentando desacuerdo en las evaluaciones. **Conclusión:** la tecnología educativa ha sido considerada facilitadora en el proceso de cuidar y educar en las acciones de salud, sirviendo como herramienta para fomentar la comunicación eficaz auxiliando en el manejo adecuado de niños con infecciones respiratorias.

**Palabras clave:** Tecnología educativa. Estudios de validación. Enfermería. Salud del niño. Guarderías infantiles.

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