

**TECHNICAL-TECHNOLOGICAL PRODUCT AND
INNOVATIVE EXTENSION****E-BOOK ON FOOD AND NUTRITIONAL EDUCATION TO
MEDIATE EXTENSION ACTIONS IN FAVOR OF PROMOTING
THE HEALTH OF THE ELDERLY**

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Abstract: Population aging intensifies the need for strategies aimed at promoting health and autonomy in old age. This article reports on the experience of developing an educational E-book as a soft-hard technology that could mediate extension actions on Food and Nutritional Education (EAN) among teachers, students and health professionals with elderly people. Educational Technology (ET) is structured around six thematic axes - full use of food, chronic non-communicable diseases, smoking and nutrition, food and nutritional security, healthy eating and food classification - each containing playful, accessible and theoretically based activities. The content is complemented by appendices that offer support materials for reproducing the educational practices to be carried out. Technology promotes the autonomy of this population, making them multipliers of knowledge about healthy eating habits and expanding the professional training of those involved. During the bibliographic review, a scarcity of similar updated materials was observed, reinforcing the importance of publishing and disseminating ETs. Educational practices with elderly people need to value Freire's pillars of empowerment and social transformation with a view to contributing to active and healthy aging. It is concluded that ETs are an effective tool to stimulate extension actions based on health education, promoting improvements in the quality of life of the elderly and strengthening the interaction between the scientific and social environment.

Key words: Food and Nutrition Education; Third Age; Health Promotion; Educational Technology; Aging.

INTRODUCTION

In Brazil, an elderly person is considered to be an individual aged 60 years or older, as defined by the Elderly Statute (Law No. 10,741/03), which ensures access to health in accordance with the principles of the World Health

Organization (WHO) (Brazil, 2009). Population aging is a growing and challenging phenomenon. According to the Brazilian Institute of Geography and Statistics (IBGE), the aging index in Brazil is expected to increase by up to 173.47% by 2060, highlighting the need to restructure public policies and invest in strategies that address the demands of this expanding population (IBGE, 2018).

Aging is a dynamic, multifactor and heterogeneous process influenced by cultural, behavioral, gender, and social aspects (Pinheiro; Areosa, 2019). This process results in physical, motor, immunological, and psychological changes that directly impact the quality of life, especially when accompanied by chronic diseases or functional and metabolic deficiencies (Ferraz et al., 2021; Moraes et al., 2020). In this scenario, Non-Communicable Diseases (NCDs) are predominant, often associated with inadequate habits such as poor diet, sedentary lifestyle, and smoking (Furtado; Tuon, 2018).

Nutrition plays a central role in health promotion, being crucial for preventing and managing chronic diseases, as well as improving quality of life throughout aging (Brazil, 2014; Ferreira et al., 2017). A balanced diet that includes all food groups in adequate proportions is essential for promoting physical, mental, and social well-being (Ferreira; Silva; Paiva, 2020).

In this context, Food and Nutritional Education (FNE) emerges as a fundamental strategy to promote healthy habits and foster the autonomy of individuals (Casagrande et al., 2018). According to the Ministry of Citizenship (Brazil, 2021), FNE should be transdisciplinary and permanent, respecting cultural and social particularities, while promoting the sharing of technical-scientific knowledge (Pereira et al., 2020).

Among the instruments that enable Food and Nutritional Education (FNE), Educational Technologies (ETs) stand out. These are defined as a set of educational practices whose main objective is interactive learning. These technologies are fundamental to mediate communication between those who transmit and those who receive knowledge, making the process more accessible and efficient (Pereira et al., 2019).

ETs can be classified into light, light-hard, and hard technologies. Light technologies refer to relational processes, such as active listening and dialogue. Light-hard technologies integrate technical knowledge and educational practices, such as manuals and E-books, while hard technologies encompass more sophisticated technological equipment and devices, such as apps and digital platforms (Vasconcelos et al., 2018). Each type of technology has its specific applicability, depending on the context and target audience.

The development of an ET requires a detailed study of the profile of the audience to be served, considering their cultural, social, and biological specificities. This analysis allows the creation of materials and strategies that not only disseminate information but also promote autonomy and the capacity for self-management of health (Lima; Ponciano, 2020).

University extension projects play a central role in this scenario, promoting the integration between academic knowledge and social demands. These initiatives allow students to put into practice the knowledge acquired while learning about the particularities of the served populations. Furthermore, extension activities strengthen the social role of the university by creating ETs and developing interventions that positively impact the quality of life of the community, especially vulnerable populations, such as the elderly (Abreu, 2020; Pinto et al., 2016; Silva et al., 2019).

The national university extension plan, launched in the early 2000, highlights that extension activities are carried out in various areas of knowledge and involve multiple strategies. These actions integrate the framework of teaching-research-extension, providing students and teachers with the development of skills, competencies, and a critical-reflective stance, fundamental for effective action within the community (Santana et al., 2021).

Santana et al. (2021) emphasize that university extension action constitutes a dynamic educational process, promoting the integration between classroom teaching and learning, as outlined in the course's pedagogical project, and the daily reality experienced through practical experience in real-world settings. For the community, these actions represent an opportunity for active participation, promoting moments of discussion and collective reflection, which facilitate the acquisition of knowledge related to the health-disease process and good health practices.

Given this scenario, the objective is to report on the experience of developing an E-book with educational activities aimed at promoting food and nutritional health in the elderly. The experience was carried out in a university extension project and was systematized as a Graduation Thesis (Nutrition) of the Federal University of Pará (UFPA), in Belém, Pará, Brazil. The technological production of the E-book aims not only to foster healthy aging but also to strengthen the interaction between the university and the community, promoting a transformative dialogue between scientific knowledge and social demands.

METHODOLOGY

The present study is descriptive in nature, presented as an experience report, on the process of developing an ET in the format of an E-book aimed at teachers, professionals, and students in the health field. It was developed from the activities carried out in the extension project entitled "Food and Nutritional Education for the Elderly". The project aimed to carry out FNE activities to promote healthy eating habits, contributing to the well-being of the elderly served by the group of the Municipal Health Unit (MHU) of Guamá, in Belém, Pará. The coordination was carried out by a professor from the Nutrition course at UFPA, with the support of the Extension Prorectorate (PROEX/UFPA) and the nutritionist of the MHU linked to the Municipal Health Secretariat of Belém (SESMA).

The extension project was approved by the Research Ethics Committee with Human Beings of the Institute of Health Sciences of UFPA, under protocol No. 2,597,877, and all participants signed the Free and Informed Consent Form (TCLE). For the production of the ET, a five-step process was followed (Figure 1).

Figure 1 – The five-step process to produce de E-book



Source: The authors, 2025.

STEP 1: Selection and organization of the FNE activities

The activities selected to compose the E-book were previously carried out in the extension project, and those that received the best evaluations from the participants were included in the ET. Thus, a total of ten practices were chosen, considering their relevance and applicability. These activities were grouped by similarity and organized into thematic axes. Each axis includes a theoretical foundation, which aims to assist teachers, professionals, and students in applying the material.

STEP 2: Research and theoretical foundation

The theoretical foundation was developed based on a bibliographic review of books, manuals, scientific articles, and graduate thesis, using the following electronic databases: Google Scholar, Scientific Electronic Library Online (SCIELO), Virtual Health Library, Latin American and Caribbean Health Sciences Literature (LILACS), and PubMed.

The search was conducted in Portuguese, covering the period from 2011 to 2022, with full-text available articles. The keywords used were based on the Health Sciences Descriptors being Elderly, Elderly Nutrition, Integral Use of Food, Smoking, Healthy Diet, Food and Nutritional Security, Food Guides, and Food and Nutritional Education.

STEP 3: Organization of the structuring thematic axes

The ET was structured into six thematic axes, defined based on the selected educational activities. Each axis was accompanied by a theoretical framework that provides scientific support for its application. The axes are: Integral Use of Food (IUF), Non-Communicable Diseases (NCDs), Smoking and Nutrition, Food and Nutritional Security (FNS), Healthy Eating, and Food Classification.

STEP 4: Review and selection of information

After defining the thematic axes, the information to compose the ET was selected and organized in an objective and attractive manner. Illustrations were included to facilitate the understanding of how to develop the activities, using visual resources such as line art and graphics. The illustrations were designed to complement the textual information, allowing for quick and efficient interpretation.

STEP 5: Design and final review of the ET

The layout and design of the manual were carried out using Adobe Illustrator software, with the illustrations and content formatted in Portable Document Format (PDF). The final review included visual and textual adjustments to ensure the clarity, attractiveness, and scientific quality of the material.

RESULTS AND DISCUSSION

The E-book entitled "Food and Nutritional Education Activities for the Elderly" was developed with the aim of enhancing the development of FNE activities among teachers, students, and health professionals, promoting health education in an accessible and practical way. Its development was based on well-defined steps, starting with mapping the needs of the target audience to tailor the content to the specific characteristics and demands of the extension project participants. This approach, according to Pereira et al. (2020), facilitates information capture and ensures greater effectiveness in communicating the proposed concepts.

The material developed is classified as a "light-hard" ET and is characterized by transcending traditional technological methods and promoting freedom and autonomy for teachers, students, and health professionals in applying the activities to the beneficiary groups. This classification is based on the combination of technical and social knowledge, allowing the development of more dynamic and effective educational practices (Sabino et al., 2016). It is a material that uses technical information combined with playful activities, stimulating the reader's interest and facilitating the reproduction of the content in various contexts. This approach helps make educational practices more attractive and relevant to the target audience, dynamizing knowledge transmission and promoting greater acceptance (Berardinell et al., 2014).

The development of educational activities in the health field is strongly based on multidisciplinary principles, enhancing health protection levels and reducing the incidence of pathologies, practices inspired by the pillars of Paulo Freire, promoting autonomy, freedom, and reality transformation, which are fundamental aspects for education aimed at social change (Lopes et al., 2015). Each thematic axis of the ET was planned to provide theoretical and practical support to the professionals who will apply the activities. The inclusion of these axes is essential to address issues relevant to the health of the elderly, such as the

impacts of inadequate eating habits and self-care practices, considering the specificities of this audience (Figueiredo; Ceccon; Figueiredo, 2021).

ETs are fundamental instruments in the health education process, as they aim at knowledge sharing, integrate the technical-scientific environment with the social environment, and contribute to improving educational performance. These technologies make educational practices more accessible and effective, especially when applied in contexts of social vulnerability (Bolico et al., 2021).

The final version of the ET has 43 pages and is organized with the following items: Cover, Cataloging sheet, Table of contents, 1. Introduction, 2. Integral use of food, 3. Non-communicable diseases, 4. Smoking and nutrition, 5. Food and nutritional security, 6. Healthy eating, 7. Food classification, References and Appendices (figure 2). The ET is available to the public in the repository of registered technologies of the Educational Technologies Studies Network (RETE Brazil - <https://www.retebrasil.com.br>).

Figure 2: Cover and Table of Contents of the E-book.

Sumário	
Apresentação.....	04
Prefácio.....	05
1. Aproveitamento Integral dos Alimentos (AIA).....	06
1.1 Degustação Culinária "Bolo da Casca de Banana".....	07
1.2 Degustação Culinária "Farofa da Casca de Batata".....	10
2. Doenças e Agravos Não Transmissíveis (DANT's).....	12
2.1 Menos sal, mais saúde.....	13
2.2 Corrida Maluca.....	16
3. Tabagismo e Nutrição.....	19
3.1 Tabagismo: Apague essa ideia.....	20
4. Segurança Alimentar e Nutricional (SAN).....	22
4.1 Higienização das Mãos e dos Alimentos.....	23
5. Alimentação Saudável.....	25
5.1 Demonstração de Horta Caseira.....	26
5.2 Nutrijunina.....	28
5.3 Conhecendo os Tipos de Leite.....	30
6. Classificação dos Alimentos.....	32
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Source: The Authors, 2025.

The ET was structured with elements aimed at facilitating understanding and practical use. The cover was designed with attractive illustrations to engage readers, providing a visual appeal that relates to the addressed themes. The cataloging sheet was included to inform the descriptive data of the publication, ensuring its correct indexing. The introduction offers an overview of the content and objectives, while the table of contents organizes the sections and activities clearly and objectively, facilitating navigation.

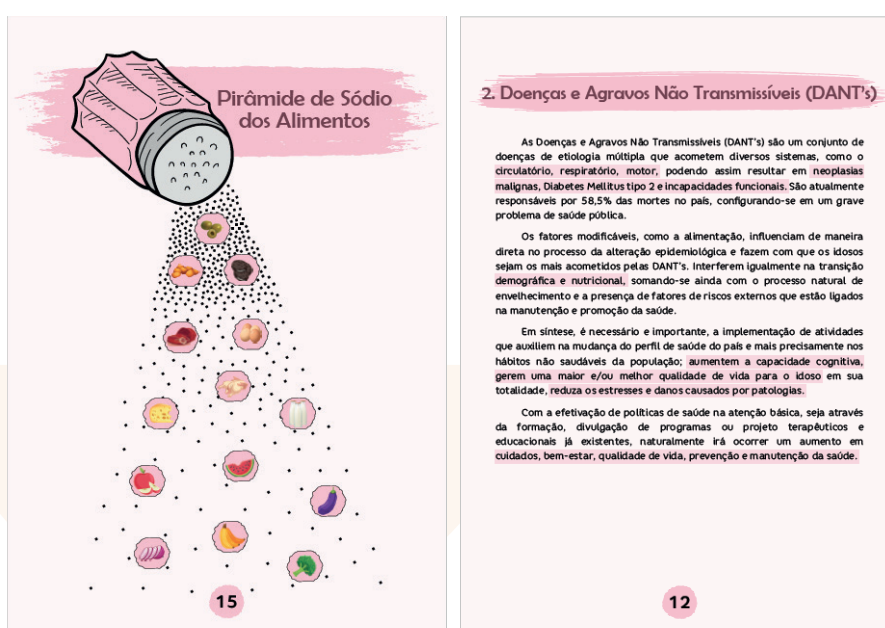
The body of the ET is composed of six thematic axes, structured to offer a solid theoretical foundation followed by practical activities that can be easily reproduced by any health professional. The proposed FNE activities are presented in a playful manner, accompanied by detailed information, including objectives, necessary materials, step-by-step descriptions, and a section called "important" that clarifies relevant specificities for successful execution.

The first thematic axis addresses the issue of Integral Use of Food (IUF), with activities highlighting sustainability and avoidance of food waste, such as the production of "Banana Peel Cake" and "Potato Peel Farofa." In this context, it is important to note that the parts normally discarded are rich in essential nutrients such as fiber, vitamins, iron, calcium, and potassium. This practice not only contributes to nutritional improvement but also favors the household economy and reduces environmental impact. Studies suggest that awareness about IUF has been growing and promoting positive changes in the population's eating habits (Laurindo; Ribeiro, 2014).

In the axis exploring NCDs, the activities are aimed at reducing salt intake and the nutrition of diabetic individuals, presented in a practical and accessible way to promote discussions about healthy eating habits. The axis on Smoking and Nutrition explores the consequences of smoking on the health of the elderly, presenting educational strategies to improve quality of life.

The nutritional transition experienced in recent decades has resulted in a significant increase in cases of overweight and obesity among the elderly, replacing the high rates of malnutrition previously observed. This change has driven the growth of NCDs (figure 3), which account for a large portion of healthcare expenditures and morbidity and mortality rates in Brazil (Furtado; Tuon, 2018).

Figure 3: Images of the health and nutritional educational activities of the E-book.



Source: The authors, 2025

The relationship between inadequate eating habits and cigarette use is another relevant issue addressed in the manual. Although many elderly people recognize the harmful effects of smoking, few associate this habit with nutritional impacts. This lack of understanding can exacerbate health problems, especially when smoking is combined with an unbalanced diet (Marques, 2021).

The axis on Food and Nutritional Security (FNS) focuses on preventing contamination and ensuring food health, including activities on hand hygiene and safe food handling. Promoting FNS is also one of the manual's objectives, considering that this practice involves guaranteeing access to quality food in sufficient quantities and in a sustainable manner. This includes respecting biodiversity, rescuing cultural habits, and promoting food sustainability, contributing to the overall health of the elderly population (Silva et al., 2022).

The axis on Healthy Eating presents three activities: planting home gardens, typical food during the June festival, and the difference between types of milk. These activities encourage sustainable and healthy practices. Finally, the Food Classification axis uses the "Food Traffic Light" strategy to explain the different types of foods (natural, minimally processed, processed, and ultra-processed), based on the Dietary Guidelines for the Brazilian Population (Brazil, 2014).

The use of the Dietary Guidelines for the Brazilian Population as an educational resource is also highlighted in the manual, mainly to help the elderly understand the current classifications of foods. This tool is essential for encouraging healthy and accessible food choices, especially in a context of social and economic transformations (Brazil, 2014).

The final part of the manual includes the references used in the preparation of the activities and the construction of the thematic axes, as well as four appendices composed of educational materials in the form of brochures. These appendices complement the practical activities and includes Culinary Tasting: Banana Peel Cake, Crazy Race, Home Garden Demonstration, and Food Box (figure 3).

Figure 3: Images of the front and back of the E-book appendix



Source: The authors, 2025

The E-book stands out as an innovative tool by combining practical activities with a theoretical foundation, allowing its application in various teaching and extension contexts. The illustrations and graphic resources were created using Adobe Illustrator, focusing on making the content accessible and didactic for different audiences. Additionally, the ET significantly contributes to promoting healthy eating habits among the elderly, while also empowering students and health professionals to develop educational practices based on scientific evidence. In this way, the ET establishes itself as an effective health education instrument, expanding the reach of FNE actions and promoting positive impacts on the quality of life of the elderly served.

FINAL REMARKS

The developed ET was designed to add value to health education practices aimed at the elderly, recognizing the need to implement strategies that promote effective communication between technical and popular knowledge. This approach allows health education to reach a wider audience, contributing to the improvement of quality of life and the strengthening of the autonomy of the elderly.

With a solid theoretical foundation for each addressed theme, the manual presents techniques arranged in simple, playful, low-cost, and easily reproducible FNE activities. This accessibility makes the material a valuable tool for educational practice. Additionally, the appendices offer additional support with materials that can be used as a base or complement, covering essential themes for the health and well-being of the target audience.

The developed ET aims to bridge the gap between the scientific and social spheres, facilitating its reproduction by teachers, students, and health professionals. This resource not only contributes to the improvement of professional practice but also enhances the learning process of the elderly. The emphasis on empowering the elderly with information about nutrition and healthy habits allows them to gain knowledge and autonomy, becoming knowledge multipliers in their communities.

Despite the advances provided, limitations were identified in the availability of updated literature and similar educational technologies aimed at the elderly. This highlights the relevance of initiatives like this one that seeks to fill existing gaps in health education focused on aging. Therefore, the publication and dissemination of this material are fundamental to expanding the reach of its proposals and encouraging the creation of other educational technologies that engage with this theme.

Furthermore, the E-book serves as an example of the importance of integrating multidisciplinary knowledge in the development of educational tools, reaffirming the role of health education as an essential strategy in promoting active, healthy, and independent aging. By establishing connections between technical knowledge and the practical demands of the elderly population, the material contributes to the construction of a more inclusive and humanized

public health scenario.

Finally, the validation, implementation, and continuity of materials like this are indispensable steps to consolidate health education as a transformative pillar. It is believed that the manual, when widely used, can have a significant impact not only on the elderly but also on the professionals and students involved, stimulating a virtuous cycle of training, learning, and social empowerment.

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