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Research Article

Use of Educational Technology to Promote Self-Care for the Elderly: Integrative Review

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Abstract

Objective: The objective is to identify in the scientific literature the use of educational technology to promote self-care for the elderly.

Method: This is an integrative review that included original articles indexed in the Latin American and Caribbean Literature in Health Sciences, Medical Literature Analysis and Retrieval System Online, Scopus, Web of Science, Science Direct, Cochrane and Google Scholar databases, in English, Portuguese and Spanish, published in the last five years, through the use of the Boolean operators "AND" or "OR".

Results: Nine articles were selected, with a predominance of experimental studies that tested the effects of technologies and of the experience report type. The technologies developed were group dynamics, use of puppets, storytelling, multimedia production and use of internet/computer programs, which portrayed care for non-communicable chronic diseases.

Conclusion: The technologies used showed efficiency for the redefinition of self-care for the elderly.

Keywords: *Elderly Health; Health Education; Educational Technology; Health Promotion*

Abbreviations

TCE: Care-Educational Technology; DCT: Chronic Communicable Diseases; PNAB: National Primary Care Policy; SUS: Sistema Único de Saúde; HIT's: Health Informatics Technology; DCNT: Chronic Non-Communicable Diseases; HAS: Systemic Arterial Hypertension; DM: Mellitus Diabetes; IRA: Acute Breathing Insufficiency; ICC: Congestive Heart Failure

Introduction

Aging is part of human development, a vital event in the natural life cycle that represents an increase in longevity, a milestone resulting from the decrease in mortality and fertility rates and an increase in life expectancy. The demographic increase of elderly people influences the organization of health services and promotes reflection on the implementation of public policies in order to provide these populations with equity and access to care institutions [1].

It is estimated that in 2025 Brazil ranks sixth in relation to countries in the world in terms of population aging, global projections point to an increase in the number of people over 60 years of age from 1.4 billion in 2030 to 2.1 billion in 2050, an increase of 50% in 20 years.

However, the declines in physical and mental capacity, associated, especially with chronic health conditions, accompany the demographic and epidemiological changes in the population profile, an event that encourages health services to promote active and healthy aging [2].

In this context, aging brings health problems that challenge the care and social security systems. Mainly when considering the multiple dimensions of life and the heterogeneity of the elderly living in the community [3].

Aging does not mean getting sick, however, the oldest old have a reduction in physiological functions that limits the autonomy of the elderly, an event that can be accelerated by the onset of chronic diseases, increasing the degree of dependence and increasing the use rates of medium and high health services complexity. Therefore, health professionals must optimize strategies for health promotion, which enhance the social participation of the elderly and promote their emancipation in care [4].

For this purpose, health education mediated by the Care-Educational Technology (TCE) stands out as a necessary tool in the practice of care. Technologies represent a set of scientific knowledge/knowledge, resulting from implemented processes, which support the operationalization of the process of caring and educating the other (individual, family and professional involved in the therapeutic plan), directly and indirectly in the transforming and modifying praxis of the popular education and health care. Thus, the TCE are mediated by the action of the subject in the aggregation of mutual and bidirectional knowledge that emerges our paths for the articulation of intervening actions carried out by social actors [5].

Educational technology must be understood as processes implemented, based on everyday experiences, aimed at the methodical development of knowledge and knowledge to be used with a specific practical purpose. Therefore, educational technology contributes to generate knowledge to be socialized [6].

In this scenario, educational technologies represent a path to the subjects' emancipation in the process of autonomy, from a perspective of critical awareness and citizenship. In the field of health service networks, technology reveals itself as a training process, of knowledge, thinking and mutual learning in the (re)construction of care.

In addition, scientific evidence points to the insufficiency of care developed for the elderly public mediated by educational technology in health, especially in the approach to Chronic Transmissible Diseases (CTD). In this sense, educational technologies are extremely necessary and relevant, as they provide information that improves knowledge and coping with the health-disease process and/or disease prevention, making the long-lived able to understand how their own actions influence their pattern of health [7].

The reviews developed in this research area seek to collaborate with the sharing of information based on scientific evidence on the construction of educational technologies for the self-care of the elderly, thus enabling the process of knowledge translation and decision-making by health professionals to instrumentalize the educational care for the oldest old.

Objective of the Study

Thus, in this study, the objective was to identify in the scientific literature the use of educational technologies in health to promote self-care for the elderly in the community.

Materials and Methods

This is an integrative review, structured in six distinct stages: 1) elaboration of the research question; 2) definition of databases and criteria for inclusion and exclusion of studies; 3) definition of the information to be extracted from the selected studies; 4) evaluation of the studies included in the review; 5) interpretation of the results; 6) presentation of the review/synthesis of knowledge [8].

The study was guided by a protocol produced by the researchers. To elaborate the research question of the integrative review, the Population Interest Context (PICo) strategy was used, within the Evidence Based Practice (EBP) these components are essential elements for the research question and the construction of the question for the bibliographic search of evidence [9]. Thus, the following structure was considered: P - elderly; I- educational technology to promote self-care; Co-institutions for elderly health care in the community. Thus, the following question was elaborated: What is the evidence in the literature on the use of Educational Technologies as a tool to promote self-care for the elderly in the community?

The bibliographic survey was carried out from March to May 2020, through virtual access to the following databases: Latin American and Caribbean Literature on Health Sciences (LILACS), by consulting the Virtual Health Library (VHL); Online Medical Literature Analysis and Retrieval System (MEDLINE), accessed through the PubMed portal; Scopus (Elsevier); Web of Science; Cochrane; Science Direct and Google academic.

The following inclusion criteria were adopted: primary articles that presented educational technology developed for people aged 60 years and over, published in the last five years, in order to analyze technologies recently developed in the self-care approach of long-lived elderly, in English, Portuguese and Spanish. Exclusion criteria were: editorials, theses, dissertations, review articles, studies that did not answer the research question and those already selected in the search in another database, this criterion was implemented in order to minimize the duplication of studies for analysis and inclusion in the review.

For the search in the databases, descriptors present in the Health Sciences Descriptors (DeCS) and their equivalents in the English language in the Medical Subject Headings (MeSH) were selected. To systematize the sample collection, the advanced search form was used, respecting the peculiarities and distinct characteristics of each database. The descriptors were combined with each other with the Boolean OR connector, within each term set of the PICo strategy, and then crossed with the Boolean AND connector, as shown in figure 1.

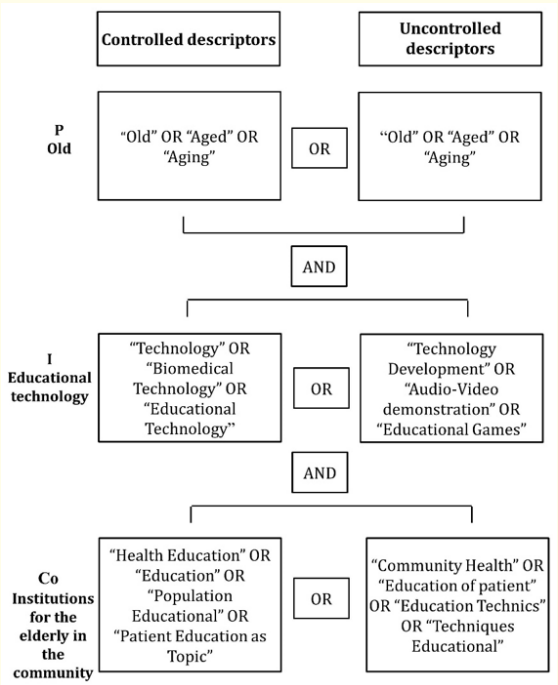

Figure 1: *Controlled and uncontrolled descriptors employed in the search strategy for population, intervention and results. Mossoró, RN, Brazil, 2020.*

Source: Prepared by the authors.

The search was performed by two independent researchers, simultaneously, who standardized the sequence of use of descriptors and crossings in each database and then compared the obtained studies and excluded duplicate articles. The exclusion process occurred only in the step of identification of the articles, those with the same title were removed from the sample and only one remained for the selection step.

For the extraction and analysis of the selected studies, an instrument adapted from the form of the Red de Enfermería en Salud Ocupacional (RedENSO Internacional) [10] was used. The following information was extracted: title, authors, year of publication, language, study objective, educational technology developed and outcome.

In the construction of the categories, an adapted script [11] was used for the thematic analysis technique. The steps are described in figure 2.

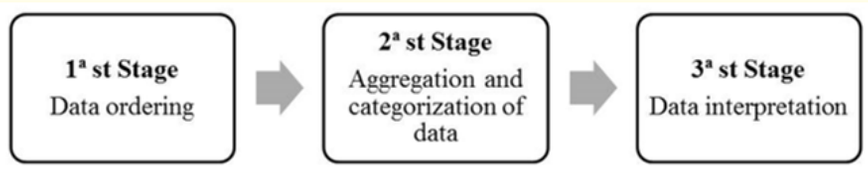

Figure 2: *Presentation of the steps for content analysis - thematic modality. Mossoró, RN, Brazil, 2021*

Source: Adapted from Gomes, 2011.

The level of evidence was determined according to this classification: level I - meta-analysis of controlled and randomized studies; level II - experimental study; level III - quasi-experimental study; level IV - descriptive/non-experimental study or with a qualitative approach; level V - case report or experience; level VI - expert consensus and opinion [12].

A total of 8,976 publications were identified from November 2020 to January 2021, of which, after applying the inclusion and exclusion criteria, 9 articles were selected for the sample of this review. No other studies were included after the manual search process. For the selection of publications, the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [13] were followed, as shown in figure 3.

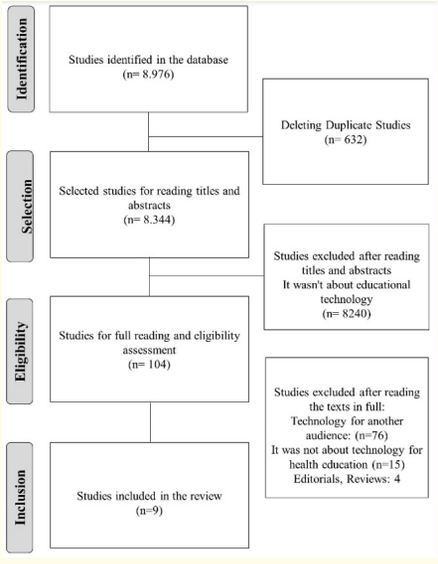

Figure 3: *Flowchart of selection of primary studies, elaborated from the recommendation prisma*. Mossoró, RN, Brazil, 2021*

Source: Prepared by the authors.

As it is an integrative review, the research was not submitted to the Research Ethics Committee (CEP). It should be noted that the ideas of the authors of the publications used in the development of this research were maintained, in order to preserve the reliability of the included studies.

Results

In this review, nine full articles were included, of which one (11.1%) was identified in Science Direct, seven (77.7%) in LILACS and one (11.1%) in Academic Google.

Regarding the language of publication, four (44.4%) were written in Portuguese, one (11.1%) in Spanish and four (44.4%) in English.

As for the design of the studies, two (22.2%) were experiments, two (22.2%) action research, two (22.2%) of the experience report type, one (11.1%) descriptive, one (11.1%) almost experimental and one (11.1%) cohort. As for the level of evidence, three (33.3%) were classified as level II publications (experimental study), one (11.1%) as level III (quasi-experimental study), one (11.1%) in the form of level IV (descriptive/non-experimental study or with a qualitative approach) and four (44.4%) in the form of level V (case report or experience).

The studies were divided into five categories, according to the type of educational technology developed, group dynamics, cloth puppet and storytelling, banner, multimedia and internet and computer programs.

Article code	Periodical	Title	Author (s)	Year/ Language	Objective	Educational technologies used/ Subject covered	Outcome
E1	BVS	Popular education as a guide for health promotion groups for people with Hypertension and diabetes in primary care: paths and learning based on an experience	Cruz, P. J. S. C., *et al*.	2018 Portuguese	This work systematizes the experience of a community group focused on promoting the health of people living with SAH and DM, developed in the context of AB through the Popular Education approach.	Group dynamic Hypertension and diabetes mellitus	Group dynamics can make up an edifying and shared application of care, from the perspective of comprehensiveness and good living, taking as approaches everyday dialogue, valuing life stories and inclusion of users' initiatives in the service agenda.
E2	BVS	Game of Attitudes: educational gerontotechnology for elderly people undergoing hemodialysis treatment	Lucca, D. C., *et al*.	2020 English	Develop and apply educational gerontotechnology through the articulation of play, aiming to promote the health of elderly people undergoing hemodialysis.	Group dynamic hemodialysis patient	The application of the Attitudes Game raised feelings such as overcoming difficulties, occupation and knowledge, in addition to enabling the remodeling of the care of the elderly undergoing hemodialysis, representing a tool to enrich the practice by allowing innovation and aid in the success of the treatment.

E3	BVS	Educational technology to guide elderly people in the care of arteriovenous fistula	Pennafort, V. P. S., *et al*.	2019 Espanish	Develop educational activity to guide the care of arteriovenous fistula, based on the demands of elderly people with chronic kidney disease undergoing hemodialysis.	Banner and cloth puppets hemodialysis patient	Doubts and inappropriate actions were revealed in the face of complications, such as bleeding, infiltrations, rupture, low fistula flow and infections. Thus, the educational activity facilitated the exchange of knowledge about the recommended care in preserving the fistula. The educational practice promoted the acquisition of new knowledge for the self-care of arteriovenous fistula.
E4	BVS	Storytelling: care technology in continuing education for active aging	Costa, N. P., *et al*.	2016 Portuguese	Assess the relevance and effectiveness of the care-educational technology "storytelling" as a strategy in cultivation of active aging (EA) for elderly users of a Basic Health Unit (UBS) in the Amazon.	storytelling healthy aging	This practice had positive results, with a change in the quality of life of the elderly, in the psychological domain. "Storytelling" proved to be an innovative technology, a relevant and effective resource for health education, especially for active aging.
E5	BVS	Construction and validation of an educational video for the elderly about the risks of falling	SÁ, G. G. M., *et al*.	2020 Portuguese	Build and validate an educational video for seniors about the risks of falling.	Multimedia Fall prevention	The video was built and validated when content and understanding and can be used to prevent falls in the elderly.
E6	Academic Google	Construction of digital educational technology for self-care in heart failure	XAVIER, C. A.; Figueiredo, P. P.; Canuso, L. D. S.	2020 English	Build a digital educational technology to guide self-care for heart failure patients and their caregivers.	Internet and computer programs Congestive heart failure	It is believed that the technology created can help in self-care management, avoiding unnecessary exposure to health services or alerting to clinical manifestations that deserve face-to-face care.
E7	BVS	Interactive educational technology on care for seniors with dementia	Camacho, A. C. F. L., *et al*.	2019 Portuguese	The purpose of the research is to present the development of an interactive blog about the care of the elderly with Alzheimer's disease (AD) and other dementia disorders as an educational technology.	Internet and computer programs Alzheimer's disease	The construction of the blog as an educational technology provides the development of cooperative and interdisciplinary learning environments, with the purpose of gathering comprehensive and adaptable knowledge to different situations about Alzheimer's disease and other dementia disorders.

E8	Science Direct	Application of the Health Literacy Index in the development of a fall prevention manual for the elderly	Andrade, I.; Silva, C.; Martins, A. C.	2016 English	Application of the Health Literacy INDEX tool in the development to create accessible and readable health information materials for people of all literacy levels in order to increase knowledge of risk factors for falls and actively engage the elderly, therefore, build an improved manual for the prevention of falls for elderly people with low levels of health and literacy entitled "Preventing falls - I can do it", with the help of INDEX.	Internet e programas informáticos Prevenção de quedas	The involvement of the elderly and their feedback obtained during the validation process contributed to the development of an improved health literacy manual for preventing falls. This has shown effectiveness for health information materials, the elderly can play a more active role in their health care. The developed manual is available to be included in any multifactorial fall prevention program for the elderly.
E9	BVS	Application on mobile platform "Agetive Elderly": lower limb exercises combining technology and health	Santos, C. M. V. T., *et al*.	2018 English	Report the development of the application "Idoso Ativo" with a proposal for exercises for lower limbs for the elderly population.	Internet and computer programs healthy aging	The software development proposal involved, through an interdisciplinary work, a selection of exercises for posture, balance and gait, preparation of the application, in addition to the application of a specific programming language with presentation of exercises on easy-to-understand screens for the elderly public, in order to promote health and prevent injuries.

Table 1: *Characteristic of the nine scientific publications on the educational technologies developed for the elderly of the community. Mossoró, RN, Brazil, 2021.*

Source: Own search data.

The results showed prevalence of educational technologies developed for self-care of hemodialysis elderly, prevention of falls and encouragement of health actions for active and healthy aging of individuals over 60 years of age.

Data from the studies were categorized according to the educational technologies used with the target audience.

The first category refers to group dynamics, which consisted of the configuration of conversation wheels mediated by instruments developed by the researchers themselves in the dialogue approach for the emancipation of participants and acquisition of new knowledge for self-care.

The results of the studies included in this category showed positive effects, with regard to the improvement of self-knowledge through the appreciation of the life history and enrichment of care strategies.

The second and third category refer to playful initiatives to enhance care through puppets and storytelling. The outcome of studies using play therapy as a tool for elderly care facilitates the acquisition of new knowledge, sharing of experiences and changes in the quality of life of the oldest old.

Health technologies developed playfully are highly democratic in terms of their implementation with the target audience, since instruments that require reading skills such as booklets, comic books, games that generally include texts limit the participation of individuals with low level of education or illiterate, a common factor among the elderly population of underdeveloped countries like Brazil. However, playful technologies facilitate the process of understanding the individual, increasing participation and enabling the (re)construction of scientifically facilitated knowledge that give new meaning to self-care in health.

The fourth category is the use of video in individual interventions for preventing falls in the elderly. The results showed that this type of educational technology was effective in improving the learning of different topics by the elderly in the community.

In the fifth category is the use of internet and computer programs through the creation of a blog, exercise application and online production of educational materials for the prevention of falls, the application of the instruments consisted in the manipulation of technology in computers and touch screen equipment, by the elderly.

Discussion

Brazil has experienced an accelerated demographic transition, which required changes in the implemented health model and suggested the creation of a care network that covered the population respecting regional realities through the construction of health promotion care [14].

When analyzing the content of the selected studies, three thematic axes represent the characteristics of the five categories of educational technologies presented in the research: 1) Health education technologies used with the elderly; 2) Themes used in educational technologies in health education with the elderly; 3) Repercussions of educational technologies on health education with the elderly.

Health educational technologies used with the elderly

Health work has particularities, being dynamically constructed through daily relationships between social actors and health professionals. In this sense, health education is one of the pillars for the promotion and prevention of health problems, which is also what the National Primary Care Policy (PNAB) [15] advocates.

One of the great challenges of the Unified Health System (SUS) is the development of care actions that express relevant meaning for the elderly and promote a change in habits. Knowing that Health Education is relevant to the development of self-care, it is necessary to understand what the usual instrument for mediating this care is.

From this perspective, TCE is an essential part of health promotion and disease prevention, as well as contributing to the early and effective treatment of diseases, minimizing suffering and disability, acting on people's knowledge and the ability to intervene in their lives [16].

Health care technologies are important tools to develop educational work and the care process. In the health area, the theme of technology plays an important role in professional daily life, as in addition to machines and equipment, the most diverse types of health technologies are available to professionals and individuals, especially light ones, such as group dynamics and light -hard [17].

The use of light care technologies occurs through expanded listening, welcoming and bonding [17], aspects that strengthen the role of the subjects involved in the construction of their care, which becomes essential in the multidisciplinary work process, promoting co-responsibility and the co-management of care.

Educational technology in health is part of the group of light technologies, called relationship technology, such as reception, bonding, empowerment, accountability and management as a way to govern work processes. The development of educational technology consistent with the cognitivity of the oldest old provides support for the elderly to appropriate knowledge that will contribute to the promotion of the health of the social actor, family and care strategies for health professionals.

The Wheel Method implemented in group dynamics, also known as the Paidéia Method [18] is a space for politicization of management, because it breaks with the bureaucratic management model, since it is in tune with many libertarian traditions in education and politics, a permanent idea of co-production and construction of subjects' autonomy, aiming at the democratization of power relations, constituting, at the same time, spaces for teaching-learning, elaboration and organization of work processes and attention to subjectivities, desires and interpersonal relationships.

Hard-technologies are considered to be equipment, machines and dead work, the result of other moments of production. In this way, they form well-structured and materialized knowledge and actions, already finished and ready [16]. Among the hard technologies aimed at elderly care are technological devices and computer programs.

The use of hard technologies in geriatrics, whether in the installation of monitoring sensors, in the inclusion of health informatic technologies (HITs) in health institutions, or in the development of software for database analysis, are of paramount importance for taking clinical decisions, in order to analyze data through the correlation of information about the health problems of the elderly population and their predictive factors of risk and anomalous behavior [19], aspects that corroborate the research findings.

Data measured by technological devices are essential for the development of public policies and prevention and health education actions. However, it must be considered that hard technologies must always be implemented from the perspective of a coalition with light technologies, with humanized care being prioritized and aimed at comprehensive care for the oldest old.

This literature review revealed that the technologies developed for health education for the elderly in the community were mainly group dynamics and the use of computer programs. Thus, it is clear that the increase in life expectancy as a global event has encouraged research and the creation of educational devices that improve the quality of life and empower the elderly for self-care.

Themes used in educational technologies in health education with the elderly

The studies included in this review used at least one type of educational technology as an instrument for the process of educational care for elderly people in the community, with a view to contributing to meaningful health learning.

The main themes addressed for educational practice with the elderly were about Chronic Non-Communicable Diseases (NCDs) such as Systemic Arterial Hypertension (SAH), Diabetes Mellitus (DM), Acute Kidney Failure (ARI), Alzheimer and Congestive Heart Failure (CHF).

It is observed that CNCDs are the focus of health education for the elderly, supposedly related to the epidemiological profile of this population. The oldest-old contingent has diversified demands for services and care, as a result of the peculiarities of organic and psychological aging and also of the set of diseases that preferentially affect this age group.

In this scenario, it is considered that in old age CNCDs have a higher incidence, a characteristic that creates a challenge to public health services, since it is not enough to increase life expectancy, but to guarantee a subsidy for active and healthy aging.

The approach to CNCDs in care workshops is essential to promote health and increase the autonomy of the oldest-old for self-care. Elderly people with one or more CNCDs are more likely to develop functional dependence, have reduced autonomy, as well as experience the last years of life with various complications [19].

From this perspective, the loss of functional capacity of individuals over 60 years of age, resulting from physical or even mental complications, may culminate in the need for intervention and adaptations to maintain routine activities and lifestyle [20].

The use of TBI as a tool to enhance care can favor the adoption of a more active lifestyle such as inclusion in leisure groups, cultural, intellectual and physical activities, improving the elderly's self-esteem and their integration with family members, directly resulting in the decrease of CNCD.

Repercussions of educational technologies on health education with the elderly

Technologies are potentiating tools for the design of technological products and processes developed, validated and/or used, under a perspective that merely permeates their conception as educational or care technologies in an isolated way, that is, without the interrelationship between the care to educate. Thus, a TCE unveils the moment when the human being manifests levels of consciousness during a reflective action, enabling emancipatory and co-responsible practices developed by individuals.

Health technology is an important tool aimed at the various conditions and demands inherent in the aging process, which can provide an improvement in the health condition and self-esteem of the elderly, autonomy in the home environment, support for self-care in medical-hospital environments. In addition, improved performance for mobility, communication and greater opportunity at work and leisure, in addition to providing the elderly with new opportunities and challenges that transcend previous generations [20].

The use of educational technologies, understood as facilitating tools in the promotion of humanized health, enhances education and guidance on the redefinition of care [5], this perspective is confluent with the results presented in the study.

Therefore, it is of fundamental importance to reflect on the knowledge needed to provide care to the elderly and how this knowledge is transmitted to the professional or family caregiver. In this process, the reality, needs, difficulties and interests of the elderly must be taken into account.

In this context, the educational technology developed with the elderly promotes reorientation through dynamic reflection and criticism about lifestyle habits, which favors self-criticism and may awaken to changes in their daily lives. Therefore, the educational process is built in a dialogical perspective in which there is a commitment to listen and to transform simultaneously [21,22].

Conclusion

It was identified, in this integrative review, that the technologies developed for health education for the elderly in the community were varied, with a predominance of group dynamics and use of internet/computer programs. The most discussed topic was the clinical management of CNCDs such as SAH, DM, ARI, Alzheimer, CHF and fall prevention.

The TBI used to promote self-care for the elderly represented relevance for individual empowerment and understanding of the health-disease process and the redefinition of health care.

Given the little production of studies that developed educational technology for self-care for the elderly, this study brings relevant contributions to health education and research, especially in the field of gerontogeriatric nursing and for the gerontological education of professionals, caregivers, family members and society in general.

The insufficiency of publications addressing aging, senescence and the dialogical appointment of health education in the context of educational technologies was evidenced as a limitation in the study.

It is suggested, therefore, that other studies be developed that favor the construction of educational technologies for the elderly on different topics in gerontology and that, in addition, evaluate their effects on health education with different approaches, through experiments in a longitudinal perspective, for evaluating long-term results.

Conflicts of Interest

We declare that there is no financial interest or conflicts and interests.

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