Construction and Validation of an Educational Booklet on Medicinal Plants Used by Quilombola Communities of the Cerrado

Construção e Validação de Cartilha Educativa Sobre Plantas Medicinais Usadas por Quilombolas do Cerrado

Construcción y Validación de una Cartilla Educativa Sobre Plantas Medicinales Utilizadas por Comunidades Quilombolas del Cerrado

RESUMO

Objetivo: descrever a construção e a validação de conteúdo de uma cartilha educativa sobre o uso de plantas medicinais por comunidades quilombolas do Cerrado. **Material e Método:** trata-se de estudo metodológico realizado em três etapas: revisão da literatura; construção da tecnologia educacional; e validação da tecnologia educacional. O critério para validação foi concordância superior a 80%, analisada por meio dos índices de validação (IVC). **Resultados:** a cartilha foi estruturada em seções sobre preparo e medidas de referência de fitoterápicos, com descrição e ilustração de 38 plantas medicinais. Utilizou linguagem clara e acessível. O IVC global foi de 95,4%. **Conclusão:** a cartilha sobre o uso de plantas medicinais por quilombolas do Cerrado foi construída e validada por especialistas, sendo considerada adequada para promover o uso seguro dos fitoterápicos. O material apoiará o público-alvo, profissionais de saúde e a população, fortalecendo o autocuidado.

DESCRITORES: Tecnologia educacional; Educação em saúde; Quilombolas; Plantas medicinais; Fitoterapia.

ABSTRACT

Objective: To describe the development and content validation of an educational booklet on the use of medicinal plants by quilombola communities in the Cerrado region. **Material and Method:** This is a methodological study conducted in three stages: literature review; development of educational technology; and validation of educational technology. The criterion for validation was agreement greater than 80%, analyzed using validation indices (IVC). **Results:** the booklet was structured into sections on the preparation and reference measures of herbal medicines, with descriptions and illustrations of 38 medicinal plants. It used clear and accessible language. The overall IVC was 95.4%. **Conclusion:** the booklet on the use of medicinal plants by quilombolas in the Cerrado was developed and validated by experts and is considered adequate for promoting the safe use of herbal medicines. The material will support the target audience, health professionals, and the population, strengthening self-care.

DESCRIPTORS: Educational technology; Health education; Quilombolas; Medicinal plants; Phytotherapy.

RESUMEN

Objetivo: describir la construcción y la validación de contenido de una cartilla educativa sobre el uso de plantas medicinales por comunidades quilombolas del Cerrado. **Material y Método:** se trata de un estudio metodológico realizado en tres etapas: revisión de la literatura; construcción de la tecnología educativa; y validación de la tecnología educativa. El criterio para la validación fue una concordancia superior al 80%, analizada mediante los índices de validación de contenido (IVC). **Resultados:** la cartilla fue estructurada en secciones sobre la preparación y las medidas de referencia de fitoterápicos, con descripción e ilustración de 38 plantas medicinales. Se utilizó un lenguaje claro y accesible. El IVC global fue del 95,4%. **Conclusión:** la cartilla sobre el uso de plantas medicinales por comunidades quilombolas del Cerrado fue construida y validada por especialistas, siendo considerada adecuada para promover el uso seguro de los fitoterápicos. El material apoyará al público objetivo, a los profesionales de la salud y a la población, fortaleciendo el autocuidado.

DESCRIPTORES: Tecnología educativa; Educación en salud; Quilombolas; Plantas medicinales; Fitoterapia.

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INTRODUCTION

The history of Brazil has been marked by processes of resistance and struggle led by black men and women subjected to hierarchical exploitation and violence under the slave regime[1]. In this context, quilombos emerged as collective forms of social organization resulting from the escape of enslaved people in search of freedom, autonomy, and preservation of their ways of life. These escapes occurred throughout the entire period of slavery and after the formal abolition of slavery[1,2] .

Quilombos, also known as mocambos in certain historical periods, were spaces of refuge and resistance, formed by both individual and collective escapes, which became progressively more frequent and structured[2] . The mocambos were settlements formed by black populations from different regions of Brazil, with different cultural and social experiences and survival strategies[3].

However, since their emergence, these communities have experienced conditions of social vulnerability that, in many cases, persist to this day, due to the insufficiency and discontinuity of public policies aimed at meeting their specific needs[4].

In the contemporary context, work activities carried out in quilombola territories are predominantly characterized by informality and the absence of formal employment relationships, with an emphasis on handicraft production, family farming and community gardens.

Data from the Anísio Teixeira National Institute for Educational Studies and Research (INEP) indicate that Brazil has only 2,526 quilombola schools, of which only 2,174 offer elementary education and only 74 offer high school education. It should be noted that in the state of Goiás, there are no schools located in quilombola territories that offer secondary education. This reality contributes significantly to increased school dropout rates among quilombola students, reinforcing educational inequalities and perpetuating cycles of socioeconomic vulnerability in the Afro-descendant population.

It should also be noted that quilombola communities have limited knowledge of the public health services to which they are entitled, as guaranteed by Ordinance GM/MS No. 4,036 of December 29, 2021. This situation contributes to these communities' greater exposure to health problems, such as cardiovascular diseases, diabetes, chronic respiratory diseases, among others[8].

It is also observed that access to health services is significantly restricted, since many quilombola territories lack public transportation or have precarious public transportation, in addition to the lack of pharmacies in the vicinity of their homes, making it difficult to obtain the medications necessary for the treatment and prevention of diseases[8,9] .

Given the limitations in access to formal health services, quilombola communities often resort to the use of medicinal plants as a self-care strategy. This practice, anchored in traditional knowledge, constitutes an ancestral heritage that dates back to the historical formation of the quilombos and has been preserved and transmitted between generations, remaining relevant to this day[9].

It is important to note that the use of medicinal plants is deeply rooted in quilombola culture, giving these communities a significant collection of traditional knowledge related to herbal medicine. In this sense, herbal medicine proves to be an accessible and culturally relevant strategy for promoting the health of these peoples[10,11] .

However, although they have empirical knowledge about the use of medicinal plants, residents of quilombola communities need the monitoring and guidance of health professionals in order to obtain reliable information about the therapeutic indications, benefits, and possible contraindications of these practices[11] .

The articulation between traditional knowledge and scientific knowledge is fundamental for the prevention of adverse events resulting from the inappropriate or indiscriminate use of medicinal plants[12] .

Given this context, it was deemed pertinent to develop an educational booklet on the proper use of medicinal plants and biosafety measures to inform quilombola populations. This type of educational technology is characterized by the use of clear and accessible language, combined with illustrative and descriptive images that aid the reader's understanding[13] .

Furthermore, because it has a simple textual structure and didactic visual resources, the educational booklet is accessible even to individuals with low levels of education. Thus, educational materials expand the reach of health education actions and are important technologies to support health professionals, contributing to permanent and continuing education processes.

Thus, the objective was to describe the construction and content validation of an educational booklet on the use of medicinal plants by quilombola communities in the Cerrado.

MATERIAL AND METHOD

This is a methodological study conducted in three stages: information gathering, development of the booklet on medicinal plants used by quilombola communities in the Cerrado, and content validation. The development followed the principles of Echer[14] , which ensured the quality and effectiveness of the material.

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The first stage consisted of collecting information from a database derived from research with residents of the quilombola communities of Pombal and João Borges Vieira, located in the central and northern regions of Goiás. A review of health-related databases supplemented the data for the construction of the booklet. The descriptors 'medicinal plants', 'ethnobotany', 'Quilombola community', 'contraindication', and the scientific names of the species were used, with the Boolean operators 'and' and *'or*'.

The second stage involved the creation of the booklet, beginning with the selection and cataloging of content from the database and national and international articles. The essential information was organized into thematic sections, and then the text was drafted. Clear and accessible language was used, suitable for readers with low levels of education, in order to broaden the understanding and reach of the educational material[13] .

Next, images were captured and illustrations were prepared based on the bibliographic references and thematic topics of the booklet. A team member produced the figures using *ibis Paint X software* [15] , using photographs of the plants and methodological guidelines. The illustrations prioritized clarity and attractiveness in order to facilitate understanding and memorization of the content.

After construction, the content and appearance were validated. The material was evaluated by judges who were experts in the subject or related areas, selected from among professors at the Evangelical College of Goianésia (FACEG) and professionals in the field. The Educational Health Content Validation Instrument (IVCES) and the Instrument for Validating the Appearance of Educational Health Technologies (IVATES) were used, and the agreement among the experts was considered[16,17] . The evaluation period was 15 days in May 2023.

The experts evaluated the objectives, structure, presentation, relevance of the content, clarity of language, and theoretical and practical relevance of the booklet. An inverted *Likert* scale was used [18] (1 = strongly disagree to 5 = strongly agree). Scores of 1 and 2 required justification, and item 3 was not considered. The data were organized and analyzed in *Microsoft Excel* 2019.

Validation used the Content Validation Index (CVI), which measures agreement among experts. It was calculated by the ratio between items with a score of 4 or 5 and the total evaluated. A CVI cutoff point of ≥ 0.78[19] was adopted. After the judges' suggestions, adjustments were made to the educational material.

The study complies with Resolution 466/12 of the National Health Council (CNS)[20] and was approved by the Research Ethics Committee (CEP) with the CAEE Research number: 45254921.7.0000.5076 and opinion No. 5.555.504.

RESULTS

The creation of the booklet began with a search for information in a database from research conducted in 2023 with residents of the Pombal and João Borges Vieira quilombos. The study characterized the knowledge and uses of medicinal plants in two quilombo communities in the Cerrado biome, focusing on the recovery and preservation of traditional knowledge and the cultural identity of the target audience.

Based on these findings, the bibliographic survey guided the definition of the topics covered in the booklet, including common and scientific names, traditional uses, parts used, methods of preparation, and reference measurements. In addition, consultation of scientific databases in the health field supplemented the information, especially with regard to the contraindications of the selected species.

Of the 88 plants mentioned by the quilombolas from the two communities, 38 were selected for inclusion in the educational booklet. The choice took into account the frequency of mention among informants and ease of access, with priority given to species that were widely referred to and readily available to residents.

After data collection, the booklet was organized into thematic sections: cover; title page; catalog card; summary; introduction, with objective, preparation process, and acknowledgments; methods of preparation of herbal medicines used by quilombolas; medicinal plants, with popular and scientific names, uses, parts used, methods of preparation, reference measurements, and contraindications; and references consulted.

In the second phase, the text was drafted, linking traditional quilombola knowledge about medicinal plants with scientific literature, in simple language accessible to the target audience. The illustrations were produced in the *Ibis Paint X* application, based on photographs of the species and visual references from *Pinterest*, to ensure fidelity to the real images. Bright colors were used, with an emphasis on green, associated with health, vitality, and harmony.

The cover of the booklet featured an illustration based on the main medicinal plants used by the quilombolas of the Cerrado, based on original photographs of the species. Green was highlighted to visually reinforce the connection with nature. The summary adopted the predominant colors of the material and a dynamic organization, in line with the aesthetic proposal of the illustrations.

A page on how to prepare the herbal medicines used by the target

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audience was included at the beginning of the booklet, with the aim of reducing repetition in the descriptions of the 38 selected plants. A section on reference measurements for liquids and solids was also added, guiding the reader on equivalencies in milliliters and grams. In the following pages, each plant was presented in a standardized layout, accompanied by illustrations and an indication of the parts used in the preparation. This organization sought to make the material lighter, clearer, and more attractive, avoiding fatigue during reading.

The booklet was produced using the *Canva* application, with *Pony Club* and *Wodland* fonts, sizes between 15 and 68, 1.5 spacing, and a palette composed of dark green, light green, light yellow, and light brown, alluding to nature and medicinal teas. The material totaled 55 pages and was printed on 115 g *Couché* paper using an *offset* system.

The content and appearance of the booklet were validated by *expert* judges. Twelve professionals were invited to form a multidisciplinary team, but only eight returned the instrument on time, constituting the final sample. The group included four nurses (two specialists in medicinal plants, one with experience in the black population and another in biotechnology), an agronomist working in agroecology, a primary care pharmacist, a geographer in the humanities, and a linguist with expertise in sociolinguistics and knowledge production by black women. Among the judges, four were doctors, two were doctoral students, and two were specialists, aged between 24 and 59 years.

The educational booklet was validated by calculating the Content Validity Index (CVI), as described in Table 1. The CVIs were calculated for each of the evaluation items in the booklet, and the results obtained were equal to or greater than 87.5%. For most of the items evaluated, there was unanimity in the experts' responses regarding their relevance, i.e., the CVI was 100%. The overall average CVI was 95.4%, confirming the validation of the appearance and content of the booklet by the experts.

Table 1 – Content validation of the items in the booklet "Construction and validation of an educational booklet on medicinal plants used by quilombolas in the Cerrado." Goianésia, Goiás, Brazil, 2023.

Booklet evaluation criteria	N=8	IVC (%)
Objectives		
1.1 The objectives are consistent with health education needs regarding the use of medicinal plants.	8	100
1.2 The booklet is important for promoting and disseminating knowledge about medicinal plants among quilombola communities in the Cerrado region.	8	100
1.3 The information in the booklet provides empirical knowledge, the result of observations and experiences of quilombola communities in the Cerrado.	8	100
1.4 The booklet can be circulated in scientific circles in the field.	7	87,5
1.5 The booklet is written in a style focused on the Qui, Lombolas people, i.e., the quilombola is the focus of importance.	7	87,5
Structure and presentation		
2.1 The booklet is appropriate for residents of quilombo communities.	7	87,5
2.2 The text is clear and objective.	7	87,5
2.3 The information is scientifically (contraindications) and empirically correct.	7	87,5
2.4 The material is appropriate to the sociocultural level of the quilombolas.	8	100
2.5 There is a logical sequence to the content presented.	8	100
2.6 The information is structured in terms of agreement and spelling.	7	87,5
2.7 The wording of the booklet corresponds to the level of knowledge of the quilombolas.	8	100
2.8 The information on the cover, back cover, summary, and introduction (presentation, preparation of the booklet, and acknowledgments) is consistent.	8	100
2.9 The size of the title and topics is appropriate.	8	100
2.10 The illustrations are expressive and sufficient.	7	87,5
2.11 The material promotes and encourages the use of medicinal plants.	8	100
2.12 The number of pages is adequate.	8	100
Relevance		
3.1 The themes portray key points that should be reinforced in health education on the use of medicinal plants.	8	100
3.2 The material allows for the transfer and generalization of learning to different contexts.	7	87,5

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3.3 The booklet proposes the construction of knowledge about the knowledge of quilombola peoples on medicinal plants.	8	100
3.4 The booklet addresses necessary topics on the use of medicinal plants.	8	100
Appearance		
4.1. The illustrations are appropriate for the target audience.	8	100
4.2. The illustrations are clear and easy to understand	8	87,5
4.3. The illustrations are relevant to the target audience's understanding of the content	8	87,5
4.4. The colors of the illustrations are appropriate for the type of material	8	87,5
4.5. The shapes of the illustrations are appropriate for the type of material	8	100
4.6. The illustrations depict the daily life of the target audience of the intervention	8	87,5
4.7. The layout of the figures is in harmony with the text	8	87,5
4.8. The figures used clarify the content of the educational material	8	87,5
4.9. The illustrations help to explain the topic and are presented in a logical sequence	8	87,5
4.10. The illustrations are adequate for the educational material.	8	87,5
4.11. The illustrations are of an appropriate size for the educational material.	8	100
4.12. The illustrations help change the behavior of the target audience	8	100

Source: Prepared by the authors, 2023.

Despite the high level of agreement, the experts' suggestions in the initial version were incorporated for their relevance, with the aim of improving content and presentation. The main changes included simplifying sentences, replacing technical terms, and adjusting formatting (Table 1). After these adjustments, the final version of the booklet was defined.

Table 1 – Suggestions from the expert judges who participated in the validation of the booklet.

Page	Suggestions from expert judges	Analysis
Cover	Use the feminine form of "quilombolas cerradeiros" if the research was conducted only with women. Or omit the gender: "quilombolas do cerrado" (J1).	Accepted
Back cover	Add section title: file/production/catalog card/realization, abbreviate surnames, and place the name of the course (Nursing Course) under the nursing symbol (J1, J2, J4).	Accepted
5	Correct "lack of free public transportation" to "lack of free public transportation," add references, and revise the text (J2, J3, J5, J8).	Accepted
7	Redo the image of Domingas so that her features are more appropriate for her age, and reword and adapt the text to make it clearer (J1, J8).	Rejected
9	Correct spelling error in the description of the juice. Item 3.	Accept
18	Replace "one cup of coffee in half a liter of water (tea) or one liter of alcohol" to make it more understandable and give examples of contraindications: "use during pregnancy (may cause miscarriage)" (J8).	Accepted
20	Illustrate the term "allergic" by placing in parentheses: individuals who have any allergy problems (J8).	Accepted
21	Replace the term "nannies."	Accepted
22	Review whether the plant should not be ingested or should not be ingested only in high quantities, insert the "and" in: "sunscreen, cancer, and infection" and correct the scientific name (specific epithet begins with a lowercase letter) (J1).	Accepted
25	Replace: "internal use during pregnancy" with "ingestion during pregnancy" (J8).	Accepted
29	Insert "and" in: "menstrual cramps and gas in children" (J1).	Accepted
31	Replace "flu, cough, fever, abortive, infection, gas, cramps, and stomachache" with "may have abortive effects and is nephrotoxic" (J8).	Rejected
32	Revise popular use and contraindications, adapting to clearer language (J8).	Accepted
44	Revise the expression: "eat proportionally the same amount of salad" that appears in the reference measure (J5).	Rejected
45	Replace the term "internal use" with "use of tea" (J8).	Accepted

Source: Prepared by the authors, 2023.

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DISCUSSION

The booklet described the preparation methods used by residents of the quilombola community, as well as the therapeutic purposes of the plants. In addition to supporting health education in quilombola communities, the booklet also provides accessible information to the population and health professionals. They can use it to improve communication and guide patients and families, strengthening the care and work of the team [21] .

In addition to expanding knowledge, the educational material values the traditional knowledge of quilombola communities[22] . Herbal medicine is part of quilombola culture and is an ancestral practice passed down orally from generation to generation. In this sense, the educational material goes beyond providing information and contributes to the preservation of the cultural identity of these communities[22,23] .

Furthermore, due to its low theoretical complexity, simple language, and didactic illustrations, the material proved to be potentially understandable even for individuals with low levels of education. The vocabulary used was appropriate for the target audience, avoiding technical terms and favoring clear and accessible words, which facilitates the appropriation of the content. The use of illustrations also stood out as a relevant strategy for capturing the reader's attention, since visual resources increase the possibilities for learning and retaining information[13,22] .

To ensure the quality of the booklet, it underwent a validation process conducted by judges from different areas of knowledge, which enabled the integration of complementary knowledge and resulted in qualified contributions to the improvement of the content. The literature indicates that multidisciplinary work in the development of educational technologies broadens the perspectives of analysis and strengthens the final quality of the material produced. In this sense, the booklet complied with Portuguese language standards and instructional design principles that facilitate navigation and understanding of the content, reducing the need for exhaustive reading.

Similar results were identified in studies that addressed the use of medicinal plants in different contexts, such as during pregnancy, in which each plant was presented with its common and scientific name, therapeutic indications, part used, contraindications, and method of preparation. These studies also highlighted the use of simple and didactic language, making the learning process accessible, interactive, and dynamic, an approach also adopted in the construction of this educational booklet. Another educational material analyzed had a similar structure, including a cover, introduction, index, and information on cultivation, care, preparation, indications, and how to use medicinal plants. Although this material used real images of the plants, it is noted that well-designed illustrations, such as those used in this study, are also capable of conveying information clearly and effectively[16,17] .

In general, the evaluations carried out by the judges were in line with the proposal of the booklet, as evidenced by the results obtained. Similar methodological studies also report high validation rates for educational materials. For example, a booklet aimed at promoting healthy eating among people with diabetes had a content validity index of 0.96, while another study aimed at promoting the health of people with hypertension achieved an overall CVI of 0.91[24,25] . These findings reinforce the methodological consistency and reliability of educational materials validated using this instrument.

Although the overall Content Validity Index obtained in this study was considered satisfactory, the judges suggested specific adjustments that contributed to the improvement of the material, highlighting the constructive nature of the validation process. Other studies that validated printed educational booklets also used the CVI as a validation method and underwent reformulations until reaching the final version, highlighting the importance of this stage in the development of educational technologies in health[13,16,17,19] .

A limitation of the study is the fact that the educational booklet was not validated with the target audience, which restricts the direct assessment of the quilombolas' level of understanding of the content presented. However, it should be noted that the information that informed the development of the material derives from research previously conducted in quilombola communities, which gave the content greater cultural relevance. In addition, the booklet was developed using accessible language and educational visual resources, with the aim of facilitating understanding and promoting health education on the safe and appropriate use of medicinal plants.

CONCLUSION

The educational booklet on the use of the main medicinal plants by quilombolas in the Cerrado was developed and validated in terms of content by expert judges. It is a resource to be incorporated into educational activities, with the potential to improve knowledge about the safe and appropriate use of these plants.

The material provides support to the target audience, health professionals, and the general population by clarifying doubts and strengthening self-care. The booklet gathers information on the parts used, methods of preparation, reference measures, and contraindications of the species covered.

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