



Healthy eating game: educational practice technology for children with Down Syndrome

Jogo da alimentação saudável: tecnologia de prática educativa para crianças com Síndrome de Down

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ABSTRACT

The objective was to develop an Educational Technology on healthy eating for children with Down Syndrome. Methodological study carried out in three stages, starting with the narrative review of the literature and the situational diagnosis in the APAE-Belém, with parents or guardians of children with DS when participating in an interview. As a result, after the analysis procedure and interpretation of the findings, three categories were identified: healthy eating, children's eating and educational technology about healthy eating. In the second stage, pre-production took place and in the third stage, the final production of the board game prototype entitled "MI dish it, father of mare". As the study progressed, it was concluded that the production of TEs that are sensitive to the reality of these individuals enables the innovation of devices converging with their needs and demands, generating a positive effect in terms of knowledge related to healthy eating and health education.

Keywords: Down's syndrome; Health education; Educational technology; Healthy eating.

RESUMO

O objetivo foi desenvolver uma Tecnologia Educacional sobre alimentação saudável para crianças com Síndrome de Down. Estudo metodológico realizado em três etapas, iniciado com a revisão narrativa da literatura e o diagnóstico situacional na APAE-Belém, com pais ou responsáveis de crianças com SD ao participaram de uma entrevista. Como resultado, após o procedimento de análise e a interpretação dos achados, foram identificadas três categorias: alimentação saudável, alimentação da criança e a tecnologia educacional sobre alimentação saudável. Na segunda etapa ocorreu a pré-produção e na terceira etapa a produção final do protótipo do jogo de tabuleiro intitulado "Meu prato pai d'égua". Com a evolução do estudo concluiu-se que a produção de TE sensíveis à realidade desses indivíduos, possibilita a inovação de dispositivos convergentes com suas necessidades e demandas, gerando um efeito positivo no que tange aos saberes relacionados à alimentação saudável e educação em saúde.

Palavras-chave: Síndrome de Down. Educação em saúde. Tecnologia educacional. Alimentação saudável.



INTRODUCTION

Down Syndrome (DS) or Trisomy 21 is a genetically determined human condition. It is the most common change in humans and one of the main causes of intellectual disability in the population. The incidence rate of this syndrome is on average 1 for every 700 live births, with a higher incidence rate in women who become mothers over the age of 35^{1,2}.

The presence of the extra chromosome in the genetic constitution determines specific physical characteristics and the developmental delay. However, it is known that people with DS, when treated and stimulated early and appropriately, have great potential for a healthy life full of social inclusion³.

Advances in medicine and nutrition in monitoring and treatment of DS patients has contributed significantly to the life expectancy and improvement in the health of these individuals, as they are more prone to the development of some conditions such as: muscular hypotonia, changes in chewing and swallowing, reduction of peristalsis and gastric emptying, insulin resistance, thyroid changes, inadequate caloric intake, constipation and overweight/obesity^{4,5,6}.

According to Silva and Sousa, most children with DS may experience high weight gain as a result of monotonous and inadequate eating habits, associated with characteristics inherent to the syndrome such as changes in basal metabolic rate, which highlights the need for intervention. nutrition and adequate dietary monitoring.

In this context, health education presents itself as a fundamental strategy to promote knowledge, enable better food choices and behavior changes, representing a conducive environment for Food and Nutrition Education (EAN) activities and health promotion actions. To do this, it is necessary to take into account the child's integral and multidisciplinary vision, checking the family, community, social and environmental context, providing the development of healthy eating habits⁷.

Educational Technologies (ET) are tools that enable health education activities and their use allows teaching moments to become diverse, being an essential requirement to achieve learning and encourage integration and effective participation of children, presenting the greatest interest, through playfulness and dynamism. It is essential to develop technological strategies that encourage children to be active^{8,9}.

Games are instruments that, in addition to providing fun, are configured as TE capable of facilitating and accelerating learning and behavior change and have become an excellent

pedagogical tool in the field of health education, as they offer stimulating, enjoyable and efficient didactic functions, and can mediate educational practices at both outpatient and home levels. The constant technological growth is visible in contemporary society, thus opening new possibilities for using this resource in education¹⁰.

Therefore, the present work aims to develop a TE on healthy eating, in the format of a board game, to mediate health educational practices among children with DS.

METHODS

This is a methodological study that is characterized by the investigation of methods for collecting and organizing data, as well as the development, evaluation and validation of research tools, favoring the conduct of investigations with rigor and care¹¹. The study was carried out in three stages (Figure 1).

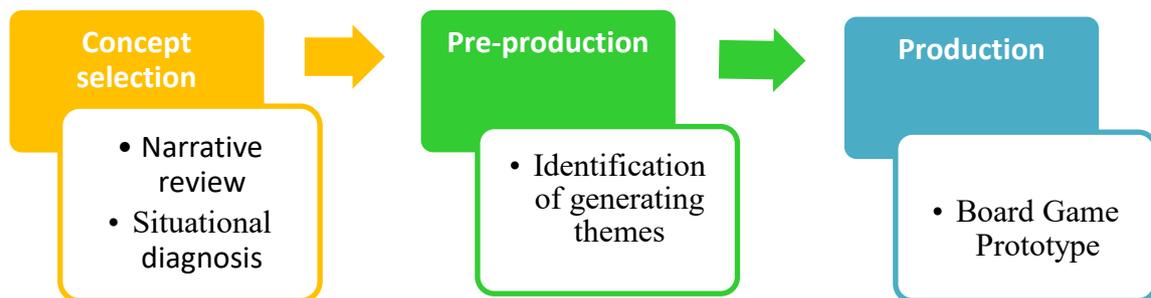


Figure 1. Stages of methodological research
Source: Prepared by the authors.

In the first stage, a literature review was carried out and the situational diagnosis. The review is likenarrative, and was carried out between March and July 2022, and guided by the guiding question: what are the main difficulties reported by parents or guardians of children with DS regarding healthy eating?

The situational diagnosis, with a qualitative approach, occurred between the months of May and August 2022, at APAE-Belém and included the participation of parents or guardians of children with SD, aged between five and ten years, of both sexes, regularly enrolled in the institution.

Data collection was carried out through a guided interview using a script with information on socioeconomic and demographic data of parents or guardians, knowledge and

children's eating habits. In order to maintain anonymity, employees were identified as “P” (participant) and listed according to the sequence of the interviews. Data collection ended when reaching the saturation point¹².

Then, the recordings were transcribed and categorical – thematic analysis was carried out. A floating reading of the transcribed material was carried out, excerpts from the texts in a recording unit, and the aggregation of information into categories and the subsequent treatment and interpretation of results¹³. The categorization was defined taking into account the research objectives and the interview script used with the participants.

The second stage was TE pre-production. Generating themes were identified from the narrative review as well as the situational diagnosis, which indicated aspects to consider in food, difficulties faced by parents or guardians in maintaining a healthy diet with children, as well as perspectives on ET for children.

Based on these themes, in the third and final stage the prototype of the board game was produced. The formatting of the game's interactive and visual identity was created with the help of a graphic designer.

The study was developed as a final work for a multidisciplinary health residency program, with its own financing and without conflicts of interest. In order to follow all ethical precepts, the steps were carried out after approval by the Research Ethics Committee of the Centro Universitário do Estado do Pará (CESUPA), under opinion no. 5,262,350. Parents or guardians who agreed to participate in the study signed the Free and Informed Consent Form and the Authorization Term for Recording by Audio Recording.

RESULTS

The sources used in the narrative review were selected by the Scielo, Google scholar, Pubmed databases, based on the definition of the theme and the guiding question, using the following search terms: down syndrome, healthy eating, health education and educational technology. For inclusion of articles, the criteria of original article or review were defined, free of charge, in the period from 2010 to 2022, in Portuguese, English or Spanish. Duplicate articles, studies published in annals and with content not appropriate to the interest of the study, were excluded from the research.

For the situational diagnosis, 18 parents or guardians participated (N=18). It was found that the most of these participants (72.2%) were mothers. The predominant age group (44.5%)

was between 40 and 49 years of age and according to marital status, 55.5% were married. In relation to education, 38.8% had completed secondary education and received between two and three minimum wages per month. From the analysis emerged three categories: child nutrition, healthy eating, educational technology about food healthy (AS).

CHILD NUTRITION

In this category, issues such as habits and the child's eating routine, types of food consumed most frequently and autonomy when eating. In view of the responses received, it can be observed that there is some difficulty regarding healthy eating habits and the consumption of fresh foods, as well as some resistance on the part of parents to allowing the child to have more autonomy with their choices. This perception can be justified in the excerpts Next:

“She's a little finicky when it comes to eating, she likes wet food, she doesn't like dry food. She only eats vegetables if they are mixed into her food” (P1).

“She only eats vegetables if they are cut and mixed. Fruits, he only takes juice, he doesn't eat much” (P2).

“He likes açai, oats, meat, fish, juice, popcorn, bananas. But sometimes you have to keep insisting. I confess that I give bottled cashew juice, which is more practical for me” (P3).

“Industrialized people consume more yogurt and those boxed juices that are more practical to transport” (P5).

“I wish he had more autonomy, most of the time we offer it and he just accepts it” (P7).

“Sometimes I let him choose, but usually I decide what he's going to eat” (P13).

HEALTHY EATING

In this category, we sought to verify the participants' knowledge about the topic of healthy eating and the main difficulties faced by children in maintaining this routine. Given the information collected, it was notable that many participants are still not so familiar with the subject, limiting themselves to relating good nutrition only to the consumption of fruits and vegetables. The difficulties reported were varied, but the common point was the refusal of some foods, generating a certain selectivity. Below are excerpts that emphasize the above findings:

“For me it's eating fruits, vegetables, natural juice and eating a lot of things he doesn't eat” (P10).

“It's eating more fruits, vegetables, foods that don't contain a lot of fried food, excess pasta” (P13).

“I think it’s about eating more salad, less fried food and fat. Eat more naturally” (P6).

“He is very selective, he only eats what he likes and it is usually always the same thing” (P12).

“I always offer good things, new things, but he doesn't want them, it's difficult to accept different food” (P7).

“You don’t like dry food, you have to have broth. We’ve tried to change, introduce new foods, but he doesn’t accept it” (P15).

EDUCATIONAL TECHNOLOGY ABOUT AS

When asked about the benefits of preparing a TE on healthy eating, which stimulates knowledge and awakens children's interest in the topic, participants' acceptance was clear. Among the technology options, the construction of a playful game was the most evident in the interviews.

It was possible to observe that many of the doubts to be resolved were of common interest, such as if there are specific foods that are more suitable for consumption; and if children can and should eat everything, information about healthy foods were some of the participants' suggestions to be covered in the game. The statements below highlight the main points highlighted by the participants:

“I think it’s very beneficial. Every project that is done to help with their development is great” (P11).

“Welcome, without a doubt. If it comes in the form of encouragement, it’s already a differentiator for him” (P12).

“It’s important, right, for her to know food better” (P16).

“Talk about quantity, quality, what should be consumed, what should not be consumed” (P5).

“I think teaching him more about how to eat a healthy diet and how to offer it to him, how to approach it” (P7).

“.. About the importance of food, the well-made food that brings a healthy diet, not only for them, but for all of us” (P14).

In the pre-production stage, the generating themes and items such as: content, language, layout, illustration were considered.ãoo and the interactivity.

In the production stage, the prototype of the board game entitled“my pai d’égua dish”, which aims to create a healthy meal, learn about food and improve eating habits.

The game consists of four placemats (fig.2); each including a main course, dessert and drink, with meals consisting of foods that can be easily included in the child's eating routine; a board (fig.3); twenty-eight foods for preparing the meal (fig.4); twenty-six educational cards

(lucky or unlucky – fig.5); a dice and a pawn. Comes with a folder containing the rules of the game (fig.6).

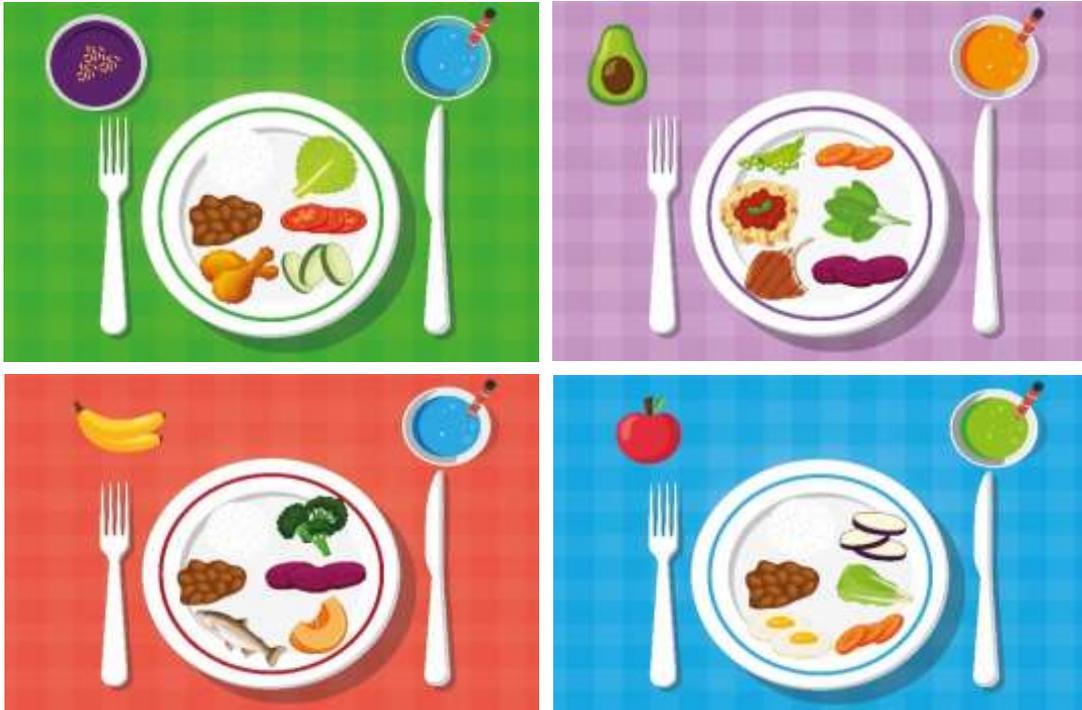


Figure 2. American Games
Source: Prepared by the authors.



Figura 3. Board
Source: Prepared by the authors.

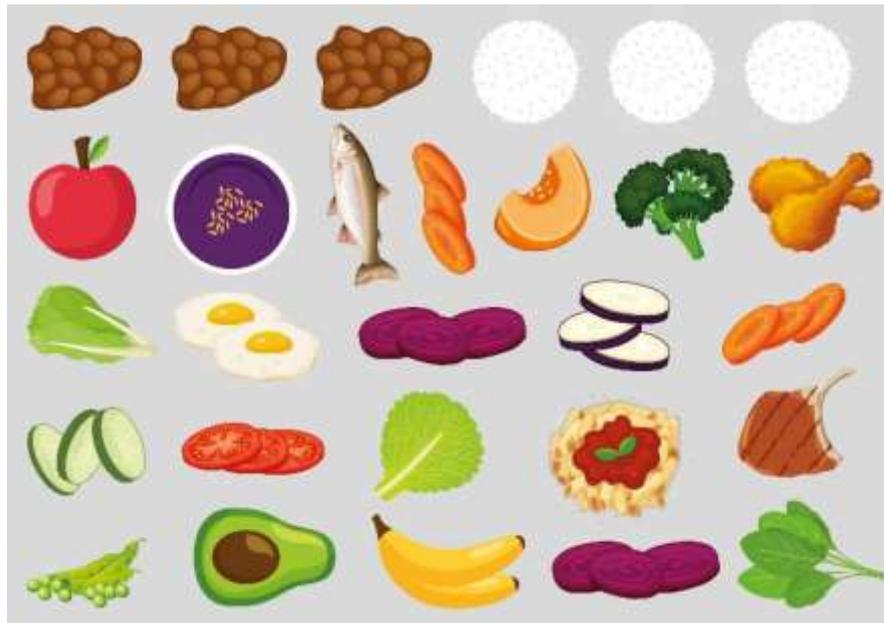


Figure 4. Food
Source: Prepared by the authors.



Figura 5. Examples of Cards (lucky and unlucky)
Source: Prepared by the authors.



Figura 6. Game rules leaflets
Source: Prepared by the authors.

The educational cards include pertinent information about a healthy eating routine, tips on foods to consume and avoid, in addition to helping interaction between players during the game. As for the information contained, content in accessible language was designed in order to reach children's attention in a positive and fun way, as shown in the table below

Chart 1. Information contained in the educational cards

CARDS LUCK	CARDS BADLUCK
<ul style="list-style-type: none"> “rice and pasta are important foods that help give energy to play and are classified as carbohydrates” win 2 foods. “green leaves contain vitamin a that helps with vision” get 1 food. “beans are rich in iron and combine very well with rice, making a super duo of nutrients” remove 1 food item from another player. “proteins (meat, eggs, fish, chicken) help build muscles and get stronger” take 2 foods from another player. 	<ul style="list-style-type: none"> “be careful with the amount of sugar in açai and juices. taste the food, don’t add sugar.” lose 1 food. “rice and pasta in the same meal don’t go together. choose just one to put on your plate.” lose 2 foods. “try not to eat coxinha, pastries or stuffed cakes between meals. eating fruit for snacks is much better.” to avoid missing food, do 5 squats. “burgers, fries, pizza are very high-calorie foods, full of salt and fat. be careful not to eat

<ul style="list-style-type: none"> • “vegetables are full of fiber and colors. always choose two or three of each color to color your plate.” get 2 foods. • “fruits are sweet, delicious and contain lots of vitamins. choose one for dessert.” get 1 food. • “açai should be consumed as a dessert or snack, not as lunch and dinner.” take 1 food item from another player. • “drinking water helps the body work better, remember to take your bottle with you.” take 2 foods from the other player. • “fruits can also become a delicious smoothie for snacks, just add a little milk and blend in a blender.” get 2 foods. • “oats are a widely consumed fiber that helps with intestinal health, how about consuming it with açai instead of flour?”. get 1 food. • “eggs are great protein options and you can eat them instead of meat, chicken or fish.” get 1 food. • “the more colorful your meal, the more strength and energy you will have.” take 1 food item from another player. • “how about trying the taste of a new food every week? invite someone to try it with you.” get 1 food. 	<p>too much.” to lose these calories and not miss a meal, do 5 jumping jacks.</p> <ul style="list-style-type: none"> • “avoid soft drinks or boxed or packaged juices, they have a lot of sugar. drink more water or fruit juices.” lose 1 food. • “eating the same thing over and over again isn't much fun. coloring your plate is livelier and healthier.” lose 2 foods. • “packaged snacks shouldn't always be consumed, how about swapping them for homemade popcorn? just be careful with the salt and butter! ”. to avoid missing a food, skip 5 times. • “reduce the amount of fried foods. eat more roasted, grilled or boiled foods.” lose 2 foods. • “do not use ready-made seasonings. to make the food tastier, use natural seasonings such as garlic, onion, and green chillies.” to avoid missing food, stretch. • “eating quickly and not chewing food well does not help with digestion. turn off the tv, sit at the table and eat slowly.” lose 1 food. • “be careful not to eat much more than you need. eat only what fits in your belly.” lose 1 food. • “going without food for a long time can cause gas. try to eat every meal of the day every 3 hours.” to avoid missing food, jump on one leg. • “don't buy snacks on the street, always take a home option when you go out” lose 1 food item.
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DISCUSSION

The purpose of developing a TE in board game format is to provide interaction and learning about healthy eating among players. The construction of educational materials enhances the guidance verbalized in consultation and such tools have a positive impact by generating knowledge, satisfaction and better adherence to the information provided¹⁴. According to Leite, Prado, Peres¹⁵, ET provide interactions between the health professional, patient and the family, its production promotes the acquisition of knowledge appropriate to reality, and thus, causes changes in attitudes, stimulating decisions autonomously through the understanding that subjects, through their behaviors, influence their own health standards.

Educational actions carried out in a playful way enable changes in knowledge about nutrition and nutrition among children and allows positive changes in the eating routine, as well as an increase in the consumption of healthy foods¹⁶. The use of board games as a strategy for

these actions proved to be suitable for absorbing content related to good eating and health habits¹⁷.

Silva et al., concluded that there is strong evidence to determine the effectiveness of games and dynamics in health education, after carrying out a study applying playful interventions to children with DS, where some parents reported changes in their eating behavior, who started consuming more fruits and natural juices and had better acceptance of vegetables in their routine. Therefore, developing games is a good EAN strategy that can influence eating and health habits, as this population is at greater risk of developing food allergies and has a higher prevalence of obesity than the general population¹⁸.

Studies have shown that among the various strategies used for EAN, games were the ones that were most successful among children and helped in the assimilation of the content presented¹⁹. Fraga et al., reinforce that educational materials have positive responses as a suitable instrument to assist parents, families, children and professionals in health education activities. There are different types of ET, however, those that present audiovisual resources, such as games, applications and videos, are able to achieve a multisensory approach, allowing interactivity and enabling a greater apprehension of the content being transmitted.

In contemporary society, the constant growth of technology is visible, thus opening up new possibilities for using this resource for education. With the application of educational games, it is possible to create a connection between play and the organization of thought, a valuable resource for working with children¹⁰. Logical reasoning and motor are improved through play. Learning occurs through playing and the capacity and conditions for development are expanded through the exchange of experiences with other children, with professionals or with the family⁷.

Silva, Sampaio, Galiza, Cabral, through an integrative review of the literature, showed in its results, the importance of creating adapted and effective educational strategies for individuals with DS that strengthen the development of skills during childhood, promoting a better socialization profile and improving behavioral and daily tasks.

Due to this context, food and nutritional education for health promotion and disease prevention uses pedagogical strategies with the aim of socializing knowledge and contributing to the training of subjects, considering the various human relationships in which they are inserted. The use of active methodologies aligned with the practice of health education actions works as a contribution to prevent injuries, promote and recover health in search of quality of life for these individuals.

CONCLUSION

The production of ETs sensitive to reality enables the production of devices that converge with the needs and demands of the target audience and its development based on situational diagnosis with parents or guardians generated a positive effect in terms of knowledge related to healthy eating, reinforcing the need to include content in TE to stimulate autonomy, learning, as well as modifying eating habits.

Therefore, using technological tools to mediate educational practices with children with DS is beneficial for both children and their families and children. professionals, since educational devices in the form of board games favor interest and the achievement of new knowledge, as well as changing eating behaviors and consequently health, seeking to achieve greater benefits for these individuals

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