Conceptual model: health education for young people

Modelo conceitual: educação em saúde para jovens

Modelo conceptual: educación sanitaria para los jóvenes

Bianca Caseiro Antonelli[1] iD
Beatriz Caseiro Antonelli[2] iD
Susy Nazaré Silva Ribeiro Amantini[2] iD
Wanderleia Quinhoneiro Blasca[1] iD
Luciana Paula Maximino[1] iD

Abstract

Preparing young people for the future is challenging for society, especially schools. Developing critical thinking and teamwork skills is essential to adequately train individuals and prepare them for personal, social, and professional challenges. Hence, it is crucial to train young disseminators of knowledge, helping improve the quality of life in society. Promoting these competencies enriches the young people's trajectories and strengthens the social fabric, fostering a more collaborative and informed environment. Thus, this study aimed to present a conceptual model for training young leaders applied to health education in schools. The method encompassed the following stages: an integrative review of health education for adolescents in schools, a narrative review on the topic of the Young Doctor Project, and an experiential analysis based on the Hackathon of Health, Technology and Communication event. The data collected were structured with the 5W2H tool, and the conceptual model was based on the stages of Design Thinking and Human-Centered Design. The conceptual model had the phases of research, organization, and execution and included the necessary steps to develop health education projects for

[1] Faculdade de Odontologia de Bauru - Universidade de São Paulo, Bauru, São Paulo, Brazil.
[2] Faculdades Integradas de Bauru, Bauru, São Paulo, Brazil.

Authors' contributions:
BCA: study design; methodology; data collection; article outline; critical review.
BCA: draft of the article; critical review.
SNSRA: methodology; critical review.
WQB: study design; methodology; data collection; critical review; guidance.
LPM: study design; methodology; article outline; critical review.

Email for correspondence: biancabijau@gmail.com

ARTICLES

young people in schools. It can be adapted according to the needs of the organizers and the community for which it is being designed.

Keywords: User-centered design; Health education; Science, technology and society.

Resumo

A preparação dos jovens para o futuro é um desafio para a sociedade, especialmente para as escolas. O desenvolvimento do pensamento crítico e da capacidade de trabalho em equipe é fundamental na formação de indivíduos, preparando-os adequadamente para os desafios da vida pessoal, social e profissional. Nesse contexto, a formação de jovens disseminadores de conhecimento assume uma importância significativa, contribuindo para a melhoria da qualidade de vida na sociedade. A promoção dessas competências não apenas enriquece a trajetória individual dos jovens, mas também fortalece o tecido social, favorecendo um ambiente mais colaborativo e informado. Assim, este estudo tem como objetivo apresentar um modelo conceitual para capacitação de jovens líderes aplicado à educação em saúde em escolas. A metodologia englobou as etapas: Revisão Integrativa sobre Educação em Saúde para adolescentes em escolas, Revisão Narrativa com o tema Projeto Jovem Doutor e Análise Vivencial, a partir do evento *Hackathon* da Saúde, Tecnologia e Comunicação Os dados coletados foram estruturados a partir da ferramenta 5W2H, e o modelo conceitual foi desenvolvido baseado nas etapas do Design *Thinking* e Design Centrado no Ser Humano. Constituído pelas fases de Pesquisa, Organização e Execução, o modelo conceitual contemplou as etapas necessárias para o desenvolvimento de projetos de educação em saúde para jovens em escolas. Destaca-se que é possível sua adaptação de acordo com a necessidade dos organizadores e da comunidade para qual se está projetando.

Palavras-chave: Design centrado no usuário; Educação em saúde; Ciência, tecnologia e sociedade.

Resumen

Preparar a los jóvenes para el futuro es un reto para la sociedad, especialmente para las escuelas. El desarrollo del pensamiento crítico y de la capacidad de trabajar en equipo es fundamental en la formación de los individuos, preparándolos adecuadamente para los desafíos de la vida personal, social y profesional. En este contexto, la formación de los jóvenes para la difusión del conocimiento adquiere una importancia significativa, contribuyendo a mejorar la calidad de vida de la sociedad. La promoción de estas competencias no sólo enriquece la trayectoria individual de los jóvenes, sino que también fortalece el tejido social, favoreciendo un entorno más colaborativo e informado. Por ello, este estudio pretende presentar un modelo conceptual de formación de jóvenes líderes aplicado a la educación para la salud en las escuelas. La metodología abarcó las siguientes etapas: Revisión Integrativa sobre Educación para la Salud de adolescentes en escuelas, Revisión Narrativa sobre el Proyecto Joven Médico y Análisis Experiencial, basado en el evento Hackathon [Identificación del autor]. Los datos recogidos fueron estructurados utilizando la herramienta 5W2H, y el modelo conceptual fue desarrollado basado en las etapas de Design Thinking y Human-Centred Design. Compuesto por las fases de Investigación, Organización y Ejecución, el modelo conceptual abarca las etapas necesarias para desarrollar proyectos de educación sanitaria para jóvenes en centros escolares. Cabe señalar que puede adaptarse en función de las necesidades de los organizadores y de la comunidad.

Palabras clave: Diseño Centrado en el Usuario; Educación en Salud; Ciencia, Tecnología y Sociedad.

Introduction

In 2015, the United Nations (UN) created the 2030 Agenda[1], a plan of action with 17 sustainable development goals and 169 targets aimed at protecting our planet and steering it toward a sustainable and resilient path, while seeking to strengthen world peace with freedom. Its foundation was built on economic, social, and environmental dimensions, with actions focused on eradicating poverty, enforcing human rights, achieving gender equality, and empowering women. Two of the 17 goals are related to health and well-being and quality education: "Ensure healthy lives and promote well-being for all at all ages" and "Ensure inclusive, equitable, and quality education and promote lifelong learning opportunities for all."

The Program for International Student Assessment (PISA) is a study conducted by the Organization for Economic Co-operation and Development (OECD) every 3 years, targeting 15-year-old students. Its purpose is to assess the knowledge and skills of students from participating countries, enabling the latter to develop policies to improve the quality of education based on the analysis. In addition to students' performance in science, mathematics, and reading, the study also evaluates other innovative domains, such as problem-solving and financial literacy[2].

PISA's Science Assessment Framework indicates scientific literacy as the rationale for the main domain of the 2015 cycle. According to the document, many of the challenges faced by humanity, such as food supply, diseases, and climate change, arise "(...) at the local level, where individuals may be faced with decisions about practices that affect their own health and food supplies, the proper use of materials, new technologies, and decisions regarding energy use". Furthermore, the document clarifies that innovative proposals will be necessary to address this century's challenges. Therefore, young people should acquire scientific and technological knowledge, which will be crucial for their social, personal, and professional development[3].

Following concepts like those of PISA, the Partnership for 21st Century Learning (P21) – part of Battelle for Kids, a national nonprofit organization in the United States[4] – emphasizes that within the context of knowledge instruction, students should also learn skills such as critical thinking, collaboration, problem-solving, and communication, essential for achieving success in today's world[5].

Thus, the need for training young leaders is justified through sustainable multiplier actions that provide university experiences and knowledge acquisition in health, technology, design, and entrepreneurship. Empowering them with knowledge and social entrepreneurship enables them to actively disseminate information, contributing to and positively impacting public health.

The Young Doctor Project is an award--winning initiative by the University for Society, using resources such as telemedicine, interactive tele-education, and the Virtual Man Project to encourage students to engage in cooperative work under university mentorship, aiming to promote health and improve the quality of life in a community. This initiative establishes a social commitment to regions and professionals[6]. Regarding the participation of young people in promoting social well-being, it emphasizes that "(...) it is one of the government's opportunities to foster social responsibility while forming future citizens. Young people have the chance to understand the different Brazilian realities"[6].

The literature presents the use and application of conceptual models in various fields of knowledge, such as health, entrepreneurship, and education.

A health study aimed to create a conceptual model by reviewing complementary and contrasting views on the effects of gambling. The results showed that the model can be used to identify areas where research is scarce, providing a foundation to develop methods to assess the impact of gambling on society, and ideally, start developing public policies on gambling[7].

Another area developed a conceptual model to identify errors or problems in the lay use of a multi-parameter monitor at home, based on the Grounded Theory method. The model is a graphical representation that identifies weaknesses in the device and user (making the operation unsafe due to its potential for erroneous use) and which device is most suitable for a specific user. Its methodology can be applied to other devices, enabling manufacturers to identify usability deficiencies[8].

Another conceptual model was developed with data from Rio Grande do Sul, Brazil. Based on its structure, two models were created to estimate the probability of the onset and spread of dengue transmission in the area. The final models accura-

ARTICLES

Bianca Caseiro Antonelli, Beatriz Caseiro Antonelli, Susy Nazaré Silva Ribeiro Amantini, Wanderleia Quinhoneiro Blasca, Luciana Paula Maximino

tely estimated the possibility of transmission and spread 3 and 4 weeks in advance. It was noted that vulnerability and receptivity indicators could be integrated with tweets and local temperature data to estimate the probability of dengue transmission. In conclusion, it showed that the models estimated the risk of the disease in different periods of the year and various scenarios[9].

A conceptual model was developed with an entrepreneurship approach to unfold level 1 processes into levels 2 and 3 based on a value chain. Bibliographic research and a case study were conducted as part of the research method, applying the developed model in an energy company. In conclusion, the model was widely applied, "(...) respecting each organization's particularities, leveraging what has already been produced internally, and seeking the engagement of senior management and opinion leaders"[10].

Combining entrepreneurship and education, the study "(...) aimed to develop a conceptual model for a business game that encompasses the key decisions an entrepreneur faces in a business' startup stage". The model was developed influenced by the diagram method, including decisions focused on business creation, derived from entrepreneurship literature. The model aimed to stimulate management concepts and decisions in entrepreneurship courses, being applicable not only for business game simulators but also for any educational entrepreneur activity[11].

The present study presents a conceptual model to train young leaders applied to health education in schools so that future projects can validate it and turn it into a method. Hence, other educational institutions and fields of knowledge may replicate and adapt it according to the needs of the community, thus making it a sustainable project. Based on this purpose, the model is expected to improve health conditions and prevention and, therefore, the population's quality of life.

The conceptual model proposed in this study was based on an integrative literature review focused on health education programs for young people in schools, also including a bibliographic survey of the Young Doctor Project's actions, created at the Medical School of the University of São Paulo by Prof. Dr. Chao Lung Wen, complemented by the Hackathon of Health, Technology and Communication's experiential analysis. Thus, the objective was to develop a robust conceptual model, with real and documented results. Therefore, it is a project grounded on both theory and practical applicability.

Material and Methods

The development of the conceptual model encompassed the phases of data collection and model creation. The basis and data collection for the conceptual model were developed in three stages: integrative literature review, narrative review, and experiential analysis. Each of these stages was based on a method with the necessary specificities.

Integrative Review

One of the three data collection stages for analysis was an integrative review of health education programs for young people in schools. Integrative reviews draw conclusions from summaries of previous research studies[12]. "The integrative review is an approach that includes studies with various methodologies (i.e., experimental and non-experimental research)"[13]. According to the authors, it can also be applied to research from other fields, beyond education and health.

The integrative review used the following research question to understand the applied health education programs and support this project's approach: "What are the health education programs for adolescents in schools, and how are they developed?".

The study searched the PubMed, LILACS, Scopus, and EMBASE databases, covering literature in Portuguese, English, and Spanish, from 2010 to July 2020. It used the following controlled descriptors from the Health Sciences Descriptors (DeCS) and the Medical Subject Headings (MeSH): ("students" OR "student") AND ("adolescent" OR "adolescents" OR "adolescence" OR "teen" OR "teens" OR "teenager" OR "teenagers") AND "health education" AND ("schools" OR "school" OR "secondary schools" OR "secondary school").

After screening articles, 27 studies were chosen for data analysis with the following information: the country where the project was conducted, the publication year, the topic, the schools and students involved, the strategies, and the assessment.

This integrative review can be accessed in full in a published article[14].

This first stage provided an understanding of how the projects are organized (encompassing the

conception of the idea, the practice with students, and the strategies for knowledge dissemination) and the approaches with the organizing team and the projects' participants.

Narrative Review

The second stage complemented the data found in the first one, conducting a narrative review on the Young Doctor Project and presenting a health education approach. The program "(...) aims to encourage high school and university students to engage in cooperative work that promotes health and improves the quality of life in underserved communities through sustained action"[15].

High school students are trained through educational materials, such as DVDs and the Virtual Man Project, and training sessions. The selected university students serve as tutors for these young individuals and supervise their activities. Interactive tele-education helps supplement knowledge, answer questions, and assess the young participants' progress[16].

The review was conducted between May and July 2020, with no restrictions on publication period. Its research question was, "What are the stages and resources used in the Young Doctor Project?".

The study searched all publications on the Young Doctor Project available in the literature in the PubMed, LILACS, EMBASE, and Scopus databases, the CAPES Journal Portal, the USP Digital Library of Theses and Dissertations, and the gray literature (Google Scholar).

The search strategy used the following terms: "young doctor project" in PubMed, EMBASE, and Scopus; "young doctor project" OR "*projeto jovem doutor*" in LILACS, CAPES Journal Portal, and Google Scholar; "young doctor" or "*jovem doutor*" in the title or "young doctor" or "*jovem doutor*" in the abstract in the USP Digital Library of Theses and Dissertations.

The review included articles, theses, and dissertations with no restrictions on language or period. As a result, 215 items were found – none in PubMed, nine in LILACS, four in EMBASE, three in Scopus, 18 in the CAPES Journal Portal, eight in the USP Digital Library of Theses and Dissertations, and 173 in Google Scholar. The following eligibility criteria based on the research question were applied to select the studies: articles, theses, and dissertations describing the program's editions and the resources and strategies used.

The exclusion criteria were secondary studies and articles not describing the program or the resources and strategies used during the training.

After reading titles and abstracts, the reviewers removed duplicates, applied the eligibility criteria, and selected 14 studies for full-text reading. After the analysis stage, these 14 studies were selected for data extraction and analysis.

The study analyzed data on the publication year, the topic, the country and state where the program was conducted, the participating schools (quantity and description), the participating students (quantity, age range, and sex), the strategies, the evaluation method, and the results.

Since it is a well-established project with numerous editions throughout Brazil, this narrative review provided concrete information to support the conceptual model.

Experiential Analysis

The integrative and narrative reviews were the model's theoretical bases. The practical study used data collected from experiential analysis of the Hackathon of Health, Technology and Communication, which is part of a larger project entitled Digital interfaces in the relationship between social entrepreneurship and health promotion in schools", approved in the public notice "Social Entrepreneurship" from the Pro-Rectory of Culture and University Extension of the University of São Paulo[17].

Hackathons are collaborative team marathons aiming to develop innovative solutions to specific challenges in a short period of time. They are usually associated with programming, but healthcare hackathons include participants from areas such as healthcare, computer science, designing, engineering, and entrepreneuring[18].

This study is included in Line of Research – Telehealth in Speech Therapy of the Postgraduate Program of the Department of Speech Therapy of the Bauru Dentistry College, University of São Paulo. The general objective of the project approved in the "Social Entrepreneurship" public notice was to develop actions aimed at social entrepreneurship focused on health promotion in schools, highlighting the training of young leaders by multiplying knowledge and sustainable actions. This project was carried out in partnership with Department of Speech Therapy at FOB/USP, Municipal Department of Education of Bauru, the Undergraduate

Bianca Caseiro Antonelli, Beatriz Caseiro Antonelli, Susy Nazaré Silva Ribeiro Amantini, Wanderleia Quinhoneiro Blasca, Luciana Paula Maximino

Design, Administration and Engineering courses at the Integrated Colleges of Bauru, and the Telemedicine Discipline at the Faculty of Medicine of the University of São Paulo.

The online Hackathon provided an immersive weekend, whose schedule had synchronous workshops taught by professionals and periods for participants to develop materials, seeking innovative solutions for hearing health and communication.

The participants were organized into teams and challenged to develop three products: an activity or game using the ScratchJr application, and two 3-minute videos: a pitch describing the activity development process, and a demonstration of how the activity works.

This project was not submitted to the Research Ethics Committee, as no data were collected from participants, nor was there any research application. Rather, it reports the experience with the activity.

In short, this study compared and correlated data collected from the theoretical analyses (integrative review of health education programs for young people and the narrative review of the Young Doctor Project) and the experiential analyses of Hackathon of Health, Technology and Communication. These materials were analyzed considering each project's strategies and results.

Structuring the conceptual model

The conceptual model was built from the results, based on previously described methods[10], through key concepts identified in the bibliographic studies that highlighted important points for its development. The method for the conceptual model was constructed from a critical analysis of the literature and shaped by "(...) interviews with researching professors from different areas of knowledge"[19].

After analyzing data from the integrative literature review, narrative review, and experiential analysis, it was necessary to determine which data would be essential to add to the conceptual model. Therefore, the study used the 5W2H tool, which highlights key points in the organizational process, as described in Chart 1.

Chart 1. Data necessary for the collection and study

5W2H	Data necessary for the collection and study
What	Health Education Program Defining the topic: What topic will be covered?
Why	Research on the topic and target audience: Why is it important to address this topic? What data is available on the topic? What are the needs of the community?
Where	Defining the location: Where will the program take place? Define whether it will be at school or another location, such as a university.
When	Developing the schedule: How much time will be needed for development?
Who	Team: Who will be part of the team? For example, undergraduate and postgraduate students, professors, and multidisciplinary professionals. Collaborators: Who are the key and possible partners for the program? This study also included the target audience in this field: Who will the program be aimed at?
How	Documentation: What documents are needed? Strategy: What steps, methods, and tools will it use? Meetings: How many meetings with young people will be needed? What will be covered in each meeting? How long will they last? Logistics: Will participants or staff need transportation? Assessment: How will the assessment be done? What will be assessed? When will the assessment take place? Timeline: How long will the project last?
How much	Budget: How much does it cost to develop and implement a health education project? What materials are needed?

The 5W2H improves the planning of any activity and can be used in various situations in corporate and educational contexts. The acronym 5W2H stands for the initials guiding the activity – the five "W"s are What, Why, Where, When, and Who (i.e., what, why, where, when, and by whom it will be done). The two "H"s are How and How Much (i.e., how it will be done and how much it will cost)[20].

After collecting data with the 5W2H, they were divided into sectors and organized sequentially. To ensure that the sequence was coherent, functional, and easy to understand, the conceptual model was built following the three main phases of Design Thinking and Human-Centered Design: Inspiration, which is when one learns about the audience for whom the design is being created, understanding their needs; Ideation, when one interprets what has been learned, explores design pathways, and develops prototypes; and Implementation, when the solution is applied[21]. These phases vary depending on the author; this study followed the one described by IDEO Design Thinking[22]. Each phase is typically developed with tools, although they were not used or cited in this study; instead, the focus was on the structure and purpose of each phase, as their actions were developed according to the needs of this study. These phases were renamed to suit the project's requirements to construct the conceptual model.

Design Thinking does not have a single definition. However, "The designer's mindset involves empathy, optimism, iteration, creativity, and ambiguity. Most importantly, Design Thinking keeps people at the center of every process. A human-centered designer knows that as long as you stay focused on the people for whom you are designing – and listen to them directly – you can arrive at ideal solutions that meet their needs"[22].

According to the Design Thinking approach and the conceptual model, the steps do not need to be developed in a fixed, predefined order. In other words, if necessary, this sequence can be altered at any moment throughout the project. Design Thinking is not a step-by-step method; rather, it alternates between and interconnects the phases of inspiration, synthesis, ideation/experimentation, and implementation[23]. Therefore, the project may change the order of some stages or go back to a stage to make modifications, depending on the project's needs and progress.

Design Thinking balances between practicability, viability, and desirability, while simultaneously considering the audience's needs and desires, leading to innovative and successful solutions[24].

Results

Integrative Review

The data obtained from the 27 articles show that the most used resources for knowledge dissemination were audiovisual presentations, Microsoft PowerPoint, and slides (found in 13 articles), and discussion, dialog, and verbal communication (present in 16 articles). Other frequently used resources included theatrical performance, dramatization, role-playing, and picture drama (cited in seven articles), and illustrations, images, and photos (mentioned in seven articles).

The students also developed and participated in activities, including research activities, expositional activities, theater, dramatization, material development, planning lessons, lectures, and seminars, and disseminating knowledge.

Narrative Review

Each edition of the Young Doctor Project has its particularities. However, the method generally consisted of in-person and distance student training, along with activities such as social actions. In the latter, the trained and certified Young Doctors disseminate knowledge to the school and the broader community.

The strategies most used to deliver content were audiovisual projection, Microsoft PowerPoint, dynamics, activities, games, playful activities, workshops, virtual online environments, audiovisual materials such as videos, 3D iconographies, Virtual Man Project, illustrations, images, and figures.

The students also shared the knowledge they acquired with the school and the community, mostly with resources such as posters, banners, planning lessons with Microsoft PowerPoint, workshops, lectures, theater, dramatization, plays, events, exhibitions, expositions, games, quizzes, and practical activities.

The Young Doctor Project editions found in the literature facilitated the transmission of knowledge to more than 6,000 people. Besides directly training students, they graduated as Young Doctors and

ARTICLES

Bianca Caseiro Antonelli, Beatriz Caseiro Antonelli, Susy Nazaré Silva Ribeiro Amantini, Wanderleia Quinhoneiro Blasca, Luciana Paula Maximino

shared the knowledge with other members of the schools, families, and the community.

Experiential Analysis

The Hackathon lasted 3 days, with the participation of 18 undergraduate speech-language-hearing students and two undergraduate law students, divided into four teams by the organizing committee.

All four teams developed the proposed materials. The team "ComunicaÊ" (Let's Communicate) created a quiz with tips to improve communication for children and young adults, helping them in stressful communication situations. The quiz had two answers for each question, one correct and one incorrect, along with reinforcement strategies, compliments, tips, and suggestions to enhance speech.

The group "Comunica Jovem!" (Communicate, Young People!) developed the idea of an app with strategies to improve communication and help young people overcome communicative difficulties. The activity presented various communication situations, allowing the user to assess what could be improved.

The group "AudiJovem" (Youth Hearing) developed a quiz with myths and facts about maintaining good hearing health to improve young people's hearing health and provide basic information about hearing health to prevent hearing loss. The quiz presents questions for the user to determine whether the statements are true or false.

The group "Os Estagiários" (The Interns) developed a game to test the user's auditory skills. The game featured the sound of rain and an animal, and the player had to choose the correct animal sound from three options.

This was an important speech-language-hearing innovation, the first one to address hearing health and youth communication combined with design and technology, conducted entirely remotely within a public university. Moreover, it identified in practical terms what is necessary to organize a health education event.

The conceptual model had key terms for each step of the health education project for youth in schools. An exclusive space was created for the item "Define the program," which is part of the Organization phase, due to the number of aspects to be considered and its level of importance.

The sequence established in the model was structured so that, if followed in order, it would effectively develop a health education program. However, it is possible to return to a previous step to adapt or modify it when necessary. For example, one can regress and then proceed with the sequence normally. However, attention must always be given to the necessary set of actions and elements to move to the next step, as in some cases, reversing the order of steps may hinder the progress of the project.

Therefore, the model and its full descriptions should be analyzed to understand the development context and follow the steps according to the specific needs of each health education program for youth in schools. The steps of the model are described in Figure 1.
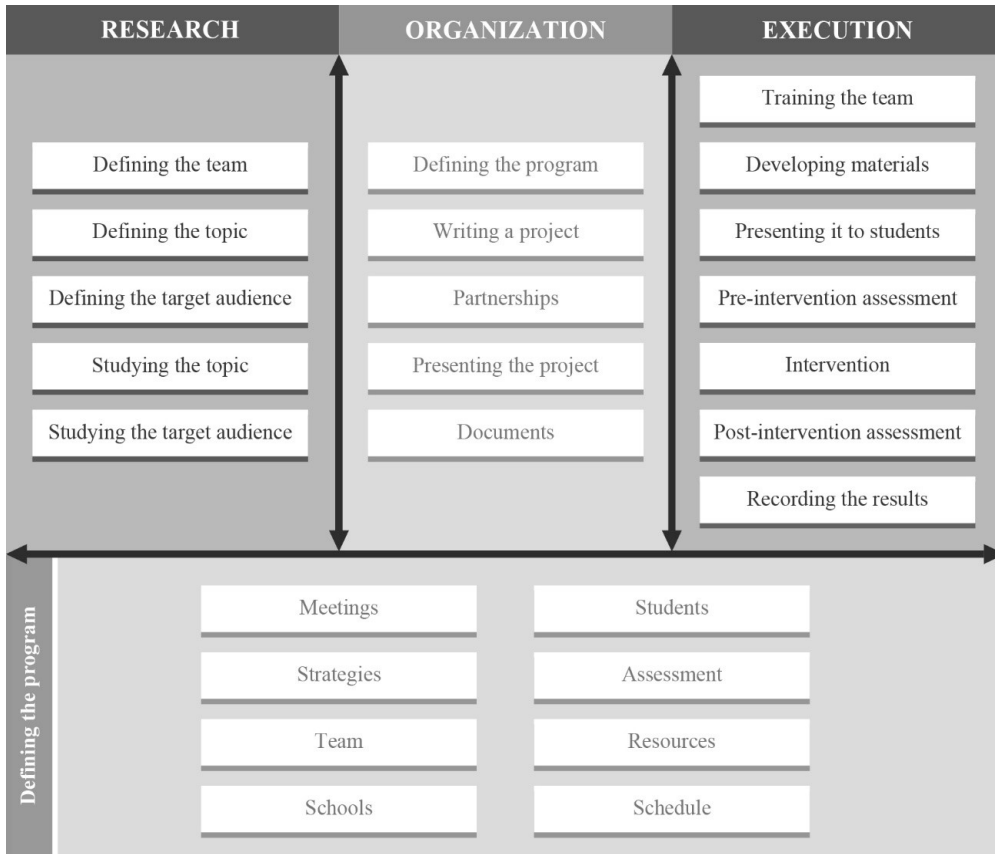
Figure 1. Conceptual model

An organizational chart (Figure 2), which is another objective visual resource, was created to complement the information in the conceptual model. It contains the same phases and steps as the conceptual model but with more detailed information and the key points that must be considered.
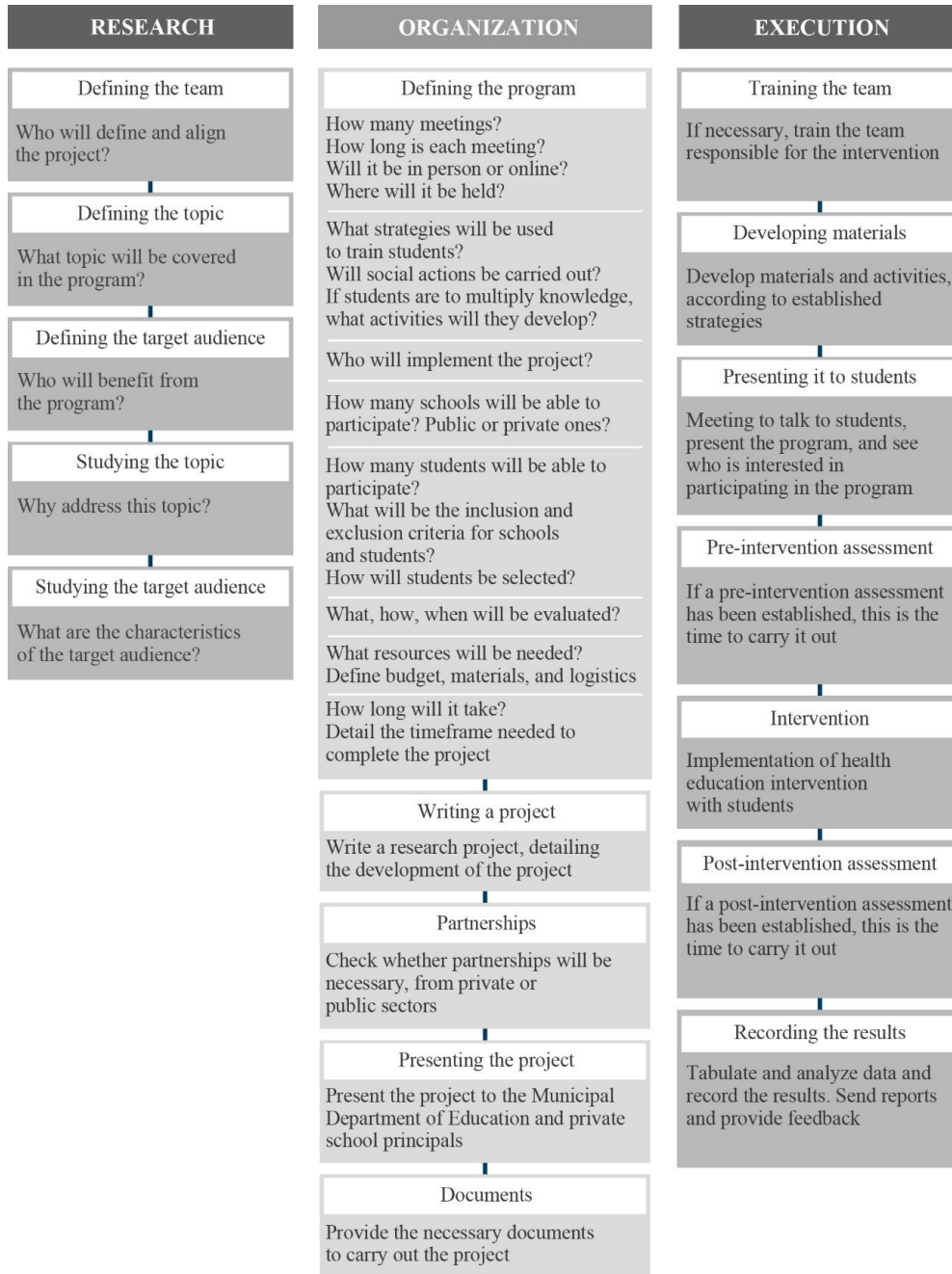
ARTICLES

Bianca Caseiro Antonelli, Beatriz Caseiro Antonelli, Susy Nazaré Silva Ribeiro Amantini, Wanderleia Quinhoneiro Blasca, Luciana Paula Maximino

RESEARCH	ORGANIZATION	EXECUTION
Defining the team Who will define and align the project?	**Defining the program** How many meetings? How long is each meeting? Will it be in person or online? Where will it be held?	**Training the team** If necessary, train the team responsible for the intervention
Defining the topic What topic will be covered in the program?	What strategies will be used to train students? Will social actions be carried out? If students are to multiply knowledge, what activities will they develop?	**Developing materials** Develop materials and activities, according to established strategies
Defining the target audience Who will benefit from the program?	Who will implement the project?	**Presenting it to students** Meeting to talk to students, present the program, and see who is interested in participating in the program
Studying the topic Why address this topic?	How many schools will be able to participate? Public or private ones?	
	How many students will be able to participate? What will be the inclusion and exclusion criteria for schools and students? How will students be selected?	**Pre-intervention assessment** If a pre-intervention assessment has been established, this is the time to carry it out
Studying the target audience What are the characteristics of the target audience?	What, how, when will be evaluated?	**Intervention** Implementation of health education intervention with students
	What resources will be needed? Define budget, materials, and logistics	
	How long will it take? Detail the timeframe needed to complete the project	**Post-intervention assessment** If a post-intervention assessment has been established, this is the time to carry it out
	Writing a project Write a research project, detailing the development of the project	
	Partnerships Check whether partnerships will be necessary, from private or public sectors	**Recording the results** Tabulate and analyze data and record the results. Send reports and provide feedback
	Presenting the project Present the project to the Municipal Department of Education and private school principals	
	Documents Provide the necessary documents to carry out the project	

Figure 2. Schedule

Using the conceptual model and organizational chart to present the project development phases and steps provides a comprehensive overview of the components, facilitating the overall understanding and development. They present the information concisely. To complement this information, the following sections detail all the phases and steps, providing examples and suggestions.

RESEARCH

This first phase conducted the necessary research to support the program, gathering data to justify its implementation.

- **Defining the team**: Who will define and align the project? These are the people who will take part in meetings for research, decision-making, and adjustments regarding the program's topic and target audience. It can be a single person or a team, but a multidisciplinary group is recommended, considering the exchange of knowledge and experiences. The team may consist of university professors, undergraduate students, postgraduate students, and professionals from the field of the program.
- **Defining the topic:** What topic will the program address? That is, what problem does it intend to solve, and what aspect of the target audience's quality of life does it aim to improve? The team should include at least one member from the specific area of focus.
- **Defining the target audience:** Who will benefit from the program? Who is it being designed for? The age group, gender, school grade, and, if applicable, any specific characteristics should be defined. That is, whether the program will target a specific group of students, considering both the direct audience (those who will receive the intervention) and the indirect audience (others who may benefit from their knowledge, such as family, friends, school community, and the wider community). This step can be performed before, simultaneously, or right after the previous step.
- **Studying the topic:** Why address this topic? This study and analysis phase focuses on the importance of developing a program with the chosen topic. It aims to understand the relevance of addressing the topic, using statistical data, the needs of the target audience and its community, and the potential impact of the program. The study can be conducted through scientific research (such as bibliographic references and case studies) or fieldwork (like visiting schools or communities to assess whether the target audience needs that topic).
- **Studying the target audience:** What are the characteristics of the target audience? What are the people like who belong to the group? Once the target audience is defined, the goal is to understand the community they belong to, including aspects such as socioeconomic situation, customs, needs, culture, behavior, likes, and preferences. These studies can be conducted through scientific research or fieldwork.

ORGANIZATION

The information gathered in the previous stage was compiled in this second one, and the team's ideas were discussed to make decisions and develop the project.

- **Defining the program:**
  - Sessions: How many sessions will the intervention need? How long will each meeting last? Will it be an in-person, online, or hybrid project? If in-person or hybrid, where will the in-person meetings be held, at school or another location? If online, what platforms will be used?
  - Strategies: What strategies will be used to train students? How will knowledge be transmitted to students? Will students be passive or active agents in the learning process? Will they carry social actions out? If students are knowledge multipliers, what activities will they develop?
  - Intervention team: Who will implement the project? At this stage, the team that will implement the project (i.e., the intervention), must be organized. Therefore, there are two independent teams. The intervention team must be contacted and assembled to align details and check availability. The team may be the same or have other members. If the team must invite new members, they should present the project before inviting them. The team may comprise university professors, undergraduate students, postgraduate students, and professionals from the program area.
  - Schools: How many schools will be able to participate? Will they be public or private schools? What will the inclusion and exclusion criteria for schools be?
  - Students: How many students can participate? Is there a minimum and maximum number of students allowed to participate? What will the inclusion and exclusion criteria for students be? How will students be selected? To decide the number of students, one must consider aspects such as resources available to train the proponents, schools, and participants. For instance, if it is an in-person program that requires computers in schools, what infrastructure does the school have? Does the school have enough computers? If it is an online program, do students have access to the Internet?
  - Assessment: What will be assessed? Knowledge, satisfaction, motivation? How will it

be assessed? In-person questionnaire, online questionnaire, observation, interview, conversations? When will it be assessed? Before the intervention, during the intervention, immediately after the end, follow-up assessment?

– Resources: What resources will be needed? Define the budget, materials, and logistics. In other words, if the program will be held in schools, how will the team travel to the schools? If it is held outside of schools, how will the students get there? Will there be gifts? Will snacks be provided? Materials can be technological or not. Some examples are stationery such as pencils, pens, cardboard, printed materials, computers, projectors, cameras, and so forth.

– Schedule: How long will it take to complete the project? Define the schedule with details of the time needed to complete the project, including the periods for the activities. The schedule should be as detailed as possible, considering the initial phases – researching the topic and audience, acquiring resources, establishing partnerships, sending documents, holding meetings to present the project, inviting and defining the intervention team, training the team, conducting the intervention, assessing (schedule a follow-up assessment besides the pre- and post-intervention assessments, if it is the case), and recording final aspects of the project and feedback.

• **Writing a project:** Write a research project, detailing the development stages. This document will be necessary to submit to the Research Ethics Committee, establish partnerships, obtain resources, and present to the State/Municipal Department of Education and school principals.

• **Partnerships:** What partnerships are necessary? Check whether partnerships from the private or public sectors will be necessary to carry out the project. If so, contact the institutions to present the project and define the partnership.

• **Presenting the project:** Present the project to the State/Municipal Department of Education and private school principals. This meeting is important to present the project to assess interest in participation. Moreover, school principals will present their points of view during the conversation, demonstrating what can be done, the resources available in the schools, and what is best for the students. This will enable any necessary adaptations and modifications to continue

with the project. One point to be discussed is the counterpart – i.e., whether at the end of the project, the team will deliver something as a result to the participating school.

• **Documents:** What documents are required? Provide the documents required to carry out the project, such as submission to the Research Ethics Committee, documents with the State/Municipal Department of Education and school principals, and documentation with partnerships if established.

EXECUTION

In this third phase, the program must be put into practice, carrying out all activities necessary to implement the intervention.

• **Training the team:** If necessary, train the team responsible for the intervention. They can be trained using various techniques (e.g., lectures, workshops, and activities) and should be provided by experts in the field, such as teachers and active professionals.

• **Developing the material:** prepare the physical and virtual material and activities for the intervention following the established intervention strategy.

• **Presenting to the students:** This stage is the team's first contact with students from participating schools. An initial meeting must be scheduled, either in person or online, to talk to students, explain and present the program, and according to the student selection method, verify those interested in participating in the program, to submit documentation, such as the assent form and, in the case of minors, the informed consent form to be signed by their parents or guardians.

• **Pre-intervention assessment:** If a pre-intervention assessment has been established, this is the time to carry it out.

• **Intervention:** carrying out the health education intervention with the students. If established, deliver the gifts.

• **Post-intervention assessment:** If a post-intervention assessment has been established, this is the time to carry it out, either immediately after the project or as a follow-up.

• **Recording the results:** After completing the program, it is important to tabulate and analyze the resulting data. Hence, everything will be ready for the next edition, making only the necessary adjustments. These records are also essential for

scientific publications, necessary reports, and feedback – i.e., the results must be presented to the State/Municipal Department of Education and the school principals. If agreed, they should also deliver the counterpart.

This conceptual model can be used to develop any and all health education programs, in different areas, as it does not impose any action, but rather guides organizers on what needs to be done, and the content can be filled in and adapted to any need and condition of the organizers and the community for which it is being designed.

Discussion

This study aimed to develop a conceptual model to train young leaders in health education so that future projects can validate it and turn it into a method. The conceptual model in hearing health and communication was completed, encompassing three main phases (research, organization, and execution), considering each stage's keywords, based on the 5W2H, Design Thinking, and Human--Centered Design.

The methods and results of the 27 articles researched in the integrative review revealed numerous strategies and resources used in the development of an effective health education project. The Brazilian studies predominantly used technological resources, such as electronic tutors for distance activities.

Data analysis predicted that the organization of a health education program for students in schools must consider the location where these programs will be carried out (including infrastructure, income, and public) and evaluate to what extent these technologies will be effective or whether they will be more unfavorable and complicating than functional and innovative.

The Young Doctor Project editions had positive results. This demonstrates that the application of in-person and virtual activities and social actions is important and effectively promotes health education for elementary and high school students. Only one of the studies analyzed did not use at least one technological resource, indicating a great demand for technological resources to develop such projects.

The social actions promoted by the Young Doctors under the guidance of researchers enable students to be active agents in the learning process, also multiplying knowledge for the school and the entire community.

The Hackathon's experiential analysis showed an exchange of knowledge integrating all the areas involved: speech-language-hearing sciences, design, and law. All teams completed the challenge and delivered the proposed products. Although the event was held entirely online, this model would also work in person. However, holding it online provided a new experience for this type of event and demonstrated its feasibility.

Therefore, this immersive technology and health event helped students learn about other areas, participate in workshops with professionals, and create solutions to the problems presented. It is a recommended model for use with young undergraduate students, addressing topics in health, design, and technology.

The 5W2H model identified the points that needed to be inserted into the model. It is used in several fields, including health, and has several applications, such as the development of support material for the implementation of clinical engineering[25], medication management in community family health centers[26], occupational health assessment of university employees[27], development of an organizational flowchart for home care for children with special health needs[28], and so on.

Design Thinking and Human-Centered Design made it possible to organize the model's data into well-defined stages. The stages named inspiration, ideation, and implementation in the cited models were named research, organization, and execution for the present model.

Some considerations are relevant regarding the development of this model. Technological resources have positive results in health education programs, as well as the participation of students as active agents in the learning process. The strategy of multiplying knowledge can benefit an entire community, increasing the number of people reached by the information in the health education program.

The integrative and narrative reviews applied in the methodology analyzed the importance of community conditions and the resources available for the health education programs, directing planning based on these data. Technological resources are important and benefit the program. However, there will not always be access to technology. Therefore, planning must consider each community's reality.

Conclusion

This study presented a conceptual model as a master line of reasoning, a practical guide applicable to health education. Thus, it finalized the model for organizing a health education project, which can be adapted to specific needs, topics, universities, and communities where it will be carried out.

Therefore, the conceptual model should be applied to develop the program, supported by the importance of developing health education proposals, involving all actors in a positive and responsible way.

References

1. Agenda 2030 para o Desenvolvimento Sustentável [Internet]. Brasília (DF): Casa ONU Brasil - Complexo Sérgio Vieira de Mello. c2023 [acessado em 2023 Mar 11]. Disponível em: https://brasil.un.org/pt-br/91863-agenda-2030-para-o-desenvolvimento-sustent%C3%A1vel

2. Programa Internacional de Avaliação de Estudantes (Pisa) [Internet]. Brasília (DF): Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Ministério da Educação. c2020 [acessado em 2021 Mar 31]. Disponível em: https://www.gov.br/inep/pt-br/areas-de-atuacao/avaliacao-e-exames-educacionais/pisa.

3. Matriz de Avaliação de Ciências [Internet]. Brasília (DF): Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Ministério da Educação. c2015 [acessado em 2018 Jul 18]. Disponível em: http://download.inep.gov.br/acoes_internacionais/pisa/marcos_referenciais/2015/matriz_de_ciencias_PISA_2015.pdf.

4. Battelle for Kids [Internet]. Hilliard (OH): Battelle for Kids. c2022 [cited 2021 Mar 31]. Available from: https://www.battelleforkids.org/about-us.

5. Framework For 21st Century Learning Definitions [Internet]. Hilliard (OH): Battelle for Kids. c2019 [cited 2019 Jul 19]. Available from: http://static.battelleforkids.org/documents/p21/P21_Framework_DefinitionsBFK.pdf.

6. Wen CL. Telemedicina e Telessaúde: Inovação e Sustentabilidade. In: Mathias I, Monteiro A, organizadores. Gold book [recurso eletrônico]: inovação tecnológica em educação e saúde. Rio de Janeiro: EdUERJ; 2012 [acessado 2019 Set 12]: p. 86-104. Disponível em: http://www.telessaude.uerj.br/resource/goldbook/pdf/5.pdf.

7. Latvala T, Lintonen T, Konu A. Public health effects of gambling - debate on a conceptual model. BMC Public Health [Internet]; 2019 Aug [cited 2019 Dec 20];19(1): [about 16 p.]. Available from: https://doi.org/10.1186/s12889-019-7391-z.

8. Reyes P, Larée D, Weinstein A, Jara A. Towards a conceptual model for the use of home healthcare medical devices: The multi-parameter monitor case. PLoS ONE [Internet]; 2018 Dec [cited 2019 Dec 20];13(12): [about 14 p.]. Available from: https://doi.org/10.1371/journal.pone.0208723.

9. Marques-Toledo CA, Bendati MM, Codeço CT, Teixeira MM. Probability of dengue transmission and propagation in a non-endemic temperate area: conceptual model and decision risk levels for early alert, prevention and control. Parasit Vectors [Internet]; 2019 Jan [cited 2019 Dec 20];12(1): [about 15 p.]. Available from: https://doi.org/10.1186/s13071-018-3280-z.

10. Warrak AKE, Farias Filho JR. Uma proposta de modelo conceitual de desdobramento de processos: Um estudo de caso em uma área de uma empresa integrada de energia. Revista Gestão Industrial [Internet];2014 [acessado em 2019 Jul 19];10(04): [cerca de 17 p.]. Disponível em: https://periodicos.utfpr.edu.br/revistagi/article/view/1572.

11. Rosas AR, Sauaia ACA. Modelo conceitual de decisões no estágio de criação de um negócio: base para construção de um simulador para jogos de empresas. Rev. adm. contemp. [Internet]; 2009 Dez [acessado em 2019 Dez 20];14(4):[cerca de 19 p.]. Disponível em: https://doi.org/10.1590/S1415-65552009000400009.

12. Broome ME. Integrative literature reviews for the development of concepts. In: Rodgers BL, Knafl KA, editors. Concept development in nursing: foundations, techniques and applications. 2ª ed. W.B. Saunders Company, 2000 [cited 2019 Sep 12]: p. 231-250. Available from: https://www.researchgate.net/publication/238248432_Integrative_literature_reviews_for_the_development_of_concepts.

13. Botelho LLR, Cunha CCA, Macedo M. O método da revisão integrativa nos estudos organizacionais. Gestão e Sociedade [Internet]; 2011 Maio-Ago [acessado em 2019 Set 12]; 5(11):[cerca de 15 p.]. Disponível em: https://doi.org/10.21171/ges.v5i11.1220.

14. Antonelli BC, Néri LF, Brito JA de, Vale SRB do, Maximino LP, Wen CL, Blasca WQ. Programas de educação em saúde em escolas para adolescentes: revisão integrativa da literatura. Distúrb Comun [Internet]. 2023 Jun [acessado em 2023 Dez 18]; 35(1): e57887. Disponível em: https://revistas.pucsp.br/index.php/dic/article/view/57887

15. Wen CL. Considerações sobre o Jovem Doutor [Internet]. Jovem Doutor. 2007 [acessado em 2019 Set 12]. Disponível em: https://jovemdoutor.org.br/programa/consideracoes-sobre-o-jovem-doutor/

16. Wen CL. Dinâmica do Jovem Doutor [Internet]. Jovem Doutor. 2023 [acessado em 2023 Dez 18]. Disponível em: https://jovemdoutor.org.br/programa/dinamica-do-jovem-doutor/

17. PRCEU – Pró-Reitoria de Cultura e Extensão Universitária. Edital 01/19: Empreendedorismo Social. São Paulo, 15 jan. 2019.

18. Mit Hacking Medicine [Internet]. Mit Hacking Medicine. c2023 [cited 2023 Mar 11]. Available from: https://www.hackingmedicine.mit.edu/.

19. Leite FCL, Costa SMS. Gestão do conhecimento científico: proposta de um modelo conceitual com base em processos de comunicação científica. Ci. Inf. [Internet]; 2007 Abr [acessado em 2019 Set 23];36(1):[cerca de 15 p.]. Disponível em: https://doi.org/10.1590/S0100-19652007000100007.

20. 5W2H: tire suas dúvidas e coloque produtividade no seu dia a dia [Internet]. SEBRAE. c2017 [acessado em 2019 Dez 20]. Disponível em: https://www.sebrae.com.br/sites/PortalSebrae/artigos/5w2h-tire-suas-duvidas-e-coloque-produtividade-no-seu-dia-a-dia,06731951b837f510VgnVCM1000004c00210aRCRD.

21. Design Kit [Internet]. Ideo.org. c2023 [cited 2021 Mar 10]. Available from: https://www.designkit.org/human-centered-design.html.

22. Design Thinking Defined [Internet]. Ideo Design Thinking. c2020 [cited 2021 Mar 10]. Available from: https://designthinking.ideo.com/.

23. Isn't design thinking a set, step-by-step process? [Internet]. Ideo Design Thinking. c2020 [cited 2021 Mar 10]. Available from: https://designthinking.ideo.com/faq/isnt-design-thinking-some-set-step-by-step-process.

24. What's the difference between human-centered design and design thinking? [Internet]. Ideo Design Thinking. c2020 [cited 2021 Mar 10]. Available from: https://designthinking.ideo.com/faq/whats-the-difference-between-human-centered-design-and-design-thinking.

25. Casemiro CDF. Material de apoio para a implantação de uma engenharia clínica baseada na ferramenta de gestão de qualidade 5W2H [trabalho de conclusão de curso]. São José dos Campos: Instituto de Ciência e Tecnologia da Universidade Federal de São Paulo; 2021.

26. Honorato AMR. A importância da gestão de medicamentos em unidade básica de saúde da família, uma experiência em um município da Região Médio Paraíba do Estado do Rio de Janeiro [trabalho de conclusão de curso]. Volta Redonda: Instituto de Ciências Humanas e Sociais da UFF de Volta Redonda; 2020.

27. Lima RA. Avaliação da saúde ocupacional dos servidores de enfermagem do departamento de Oftalmologia e Ciências Visuais na UNIFESP [dissertação]. São Paulo: Universidade Federal de São Paulo - Escola Paulista de Medicina; 2021.

28. Rossetto V, Toso BRGO, Rosa Maria Rodrigues RM. Fluxograma organizativo de atenção domiciliar às crianças com necessidades especiais de saúde. Rev Bras Enferm. [Internet]; 2020 [acessado em 2023 Dez 18];73(Suppl 4):[cerca de 8 p.].. Disponível em: http://dx.doi.org/10.1590/0034-7167-2019-0310