

Proposition of a cell phone application for people with diabetes and foot at risk: idea generation technique*Propuesta de una aplicación de celular para personas con diabetes y pie en riesgo: técnica de generación de ideas**Proposição de um aplicativo de celular para pessoas com diabetes e pé em risco: técnica de geração de ideias***Antonio Dean Barbosa Marques¹**

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Armada de Oliveira**Submission:** 11-14-2020**Approval:** 11-20-2020**Abstract**

The aim was to describe the proposal of a mobile APP for people with diabetes and foot at risk, through the creative technique of generating ideas SCAMPER. Descriptive, exploratory study with a qualitative approach, using an idea generation technique. To create an innovative product, different information was combined, and these were compared to the list of questions using the SCAMPER technique, in response to the need to create an attractive and competitive APP. The proposition of a prototype of a multimedia APP emerged based on the needs of the end user (target audience) and scientific recommendations, at the same time innovative in the market, to guarantee usability and favor behavior change. The SCAMPER technique proved to be effective in the development of creative thinking.

Descriptors: App; Diabetic Foot; Techniques of Creativity; Innovation; SCAMPER.**Resumen**

El objetivo fue describir la propuesta de una APP móvil para personas con diabetes y pie en riesgo, mediante la técnica creativa de generar ideas SCAMPER. Estudio descriptivo, exploratorio con abordaje cualitativo, utilizando una técnica de generación de ideas. Para crear un producto innovador se combinó información diversa, que se comparó con la lista de preguntas utilizando la técnica SCAMPER, en respuesta a la necesidad de crear una APP atractiva y competitiva. La propuesta de un prototipo de APP multimedia surgió en base a las necesidades del usuario final (público objetivo) y recomendaciones científicas, a la par que innovadoras en el mercado, para garantizar la usabilidad y favorecer el cambio de comportamiento. La técnica SCAMPER demostró ser eficaz en el desarrollo del pensamiento creativo.

Descriptorios: Aplicación; Pie Diabético; Técnicas de Creatividad; Innovación; SCAMPER.**Resumo**

Objetivou-se descrever a proposição de um APP de celular para pessoas com diabetes e pé em risco, por meio da técnica criativa de geração de ideias SCAMPER. Estudo descritivo, exploratório com abordagem qualitativa, por meio de uma técnica de geração de ideias. Com o intuito de criar um produto inovador, procedeu-se a combinação de distintas informações apuradas, e estas foram contrastadas a lista de perguntas usando a técnica SCAMPER, em resposta à necessidade de criar um APP atrativo e competitivo. Emergiu a proposição de um protótipo de APP multimídia fundamentado nas necessidades do usuário final (público-alvo) e recomendações científicas, ao mesmo tempo inovador no mercado, para garantir usabilidade e favorecer mudança de comportamento. A técnica SCAMPER mostrou-se eficaz no desenvolvimento do pensamento criativo.

Descritores: Aplicativo; Pé Diabético; Técnicas de Criatividade; Inovação; SCAMPER.

Introduction

Communication, creativity, and innovation are related to various reading links. They show the interface of the theoretical discussion on the practice and management of new technologies and media that cross the academic field. The different areas of human knowledge present dissimilar paradigms, concepts and definitions for creativity and innovation, so there is no univocal definition for both concepts¹.

Innovation is an important factor in increasing the competitiveness of companies, as it allows the restructuring of organizational processes, in addition to the development of new products, technologies and processes, which, in turn, corroborates to maintain the competitiveness of companies, as the market gives greater added value to differentiated products^{2,3}.

Consumers have a growing range of product options and can specify their desirable characteristics, making it imperative for companies to analyze consumer preferences before developing a new product⁴.

Based on this context, the health sector has a high technological density, covering all stages of the product development process, from conceptualization to market insertion, and thus, as in other sectors, the renewal of the products offered has become necessary to keep on the market. Creativity stands out as one of the essential factors for the development of new products, a skill that must be enhanced to generate ideas, providing improvements, opportunities, and learning.

In Brazil, the use of technology in health care is still a challenge. Existing technological innovations account for a significant portion of research effort. However, there is a need to deepen health knowledge, as well as the implementation of initiatives that seek a socially inclusive and economically competitive development model⁵.

In recent years, technological advances and connectivity have led to a dramatic increase in mobile applications (APP) in health, making access to information easy and fast, which has changed the way of promoting health. To the detriment of global health projections, diabetes is the object of software companies, with the aim of providing resources for people to manage their own health, which makes a mobile interactive system essential that impacts on the knowledge and behavior of people with diabetes for and / or self-care and attractive⁶.

In this way, the International Diabetes Federation (IDF) recommends that patients, health professionals, professional associations and APP developers recognize the characteristics of these products and services to capitalize on the advantages and avoid harmful deficiencies. This fact can make the investment in eHealth successful, not restricted to the mere development of the technological resource⁶.

For this, innovation and creativity are indispensable in the entrepreneurial process. There are several tools and techniques that facilitate the work of generating ideas. These techniques that can be used to produce ideas in a more general sense or have a restricted character depending on the peculiarities of the company and the market needs to which you want to respond⁷.

To create a new and innovative resource, the SCAMPER brainstorming technique was adopted. This mnemonic uses a set of targeted questions to solve a problem or transform an idea⁸.

This article aims to describe the proposal of a mobile application for people with diabetes and foot at risk, through the creative technique of generating ideas SCAMPER.

Methodology

This is a descriptive study in a qualitative approach, resulting from an unfolding of the doctoral thesis entitled: Multimedia application on a mobile platform for the promotion of foot care for people with diabetes: randomized controlled clinical trial.

It is noteworthy that the present article is based on the findings in the previous phase, developed through a systematic review of the literature and benchmarking. With this material in hand, we sought an answer to the list of pre-established questions.

The SCAMPER technique was used. This technique, in addition to following the order established by the initials corresponding to the word SCAMPER, are established in three phases:

1: Identification of the problem, situation, or creative focus. That is, on what theme will this technique be used.

2: The list of SCAMPER questions is formulated from the perspective of the topic presented.

3: After a sufficient period in which, through the search for answers to questions, ideas are generated to solve a problem or face a defined situation, the evaluation and decision on which ideas are valid or suitable for the company⁷.

Considering the perpetration of the number of APPs available for people with diabetes and feet at risk, we had the problem of developing an application that transfers those available in virtual stores, with a view to promoting daily care and improving proficiency on feet on.

The core of the SCAMPER consists of the questions, that is, phase 2. To better understand its use, it is presented in Chart 1 below:

Chart 1. Process / product redefinition, transformations, and typical issues. Fortaleza, CE, Brazil, 2020

Reset Process / product:	Transformations	Typical issues
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R	Replace	What can I replace to improve? What happens if I change X to Y? How can I replace the place, time, materials, or people?
M	Match	What materials, characteristics, processes, people, products, or components can we combine within the problem area? Where can I create synergy with or other product / process areas?
A	Adapt	What other products / processes are like our problem? What could we change to adapt them to our problem?
M	Modify/ Magnify / Minify	How can we totally change the product / process? Can it be improved by making it stronger, bigger, more exaggerated, or more frequent? Can it be improved by making it smaller, lighter, shorter, less important, or less frequent?
P	Put in other uses	What other products / processes could do what we want? How can we reuse other products / processes that are already happening?
E	Eliminate	What would happen if we removed a part of the product / process? What would happen if we removed everything? How can we achieve the same goal, if we have not been able to do it this way?
R	Rearrange/ Reverse	What if the process is reversed? What if you do step B before step A? What if A becomes the last step and Z the first? What if you do the steps together?

In respect to the ethical and legal precepts that govern research involving human beings in Brazil, this study was approved by the Research Ethics Committee of Universidade Estadual do Ceará under opinion number 2,267,127. It is noteworthy that it is in the process of registering the APP's brand and software with the Ceará Nucleus of Technology and Industrial Foundation (NUTEC) under number of industrial property protocol 10/2019.

Results

To create an innovative product, different information was combined, and these were compared to the list of questions using the SCAMPER technique, in response to the need to create an attractive and competitive APP, as shown in Chart 2.

Chart 2. Proposition of the application based on the SCAMPER technique. Fortaleza, CE, Brazil, 2020

Replace	Real images by drawings and / or animations
Match	Combine resources identified as enhancers to promote self-care in APPs available in stores with scientific recommendations Ensuring basic and advanced functions
Adaptation	Adapt the alarm for daily care and another based on risk stratification Adapt video with exercises to improve the circulation of lower limbs by GIFS Adapt the content to different groups of people with literary ability Expand the scope to promote daily care and identify complications Apply APP usability testing and clinical validation Include space to publicize events in the area and physical and electronic addresses of class entities
Modify	Expand APP for several operating systems Validate content and appearance by experts and the target audience
Put it to use	Publicize the APP in scientific events, publication, social media and make it available on platforms for free
Eliminate	Need for Internet connection and geographic location for use Graphic registration and monitoring Restrict use to healthcare professionals
Reinvent	Readapt based on recommendations from experts and target audience

The use of drawings instead of real images was since in their social representation they are not loaded with judgments. When using real images, in this case on the diabetic foot, there are two poles, a healthy (beautiful) foot and an unhealthy and complicated foot - ulcer, necrosis

(ugly). These can negatively impact the user's understanding, impacting usability. Thus, we sought graphic representations that crossed these barriers and respected the precepts of copyright and image, opting for free images.



The combination of available and well-evaluated resources in some APPs enhanced the creation of a different and innovative product for the market. Thus, we sought to add basic and advanced operational functions of products available in online stores and recommendations from the literature. To reach this stage, benchmarking of the available APPs and a literature review on efficacy and effectiveness were carried out in a previous study that supported the generation and feasibility of executing the best proposals.

We sought to adapt the available resources to the APP that represented an improvement in the final product. In this way, the alarm was adapted so that it would sound daily and according to the risk stratification so that the end user (person with diabetes and foot at risk) would seek professional assistance; shape video with exercises to improve the circulation of lower limbs by GIFS, as they have lower density; the focus and scope of the APP and convergence for the most varied groups of people with different literacy skills; verify usability through tests and clinical validation; and provide space to publicize events in the area and physical and electronic addresses of class entities.

Validating the product by judges and by the end user and making it available in different mobile operating systems and with free download allows to obtain better positioning in the market and competitive advantage, increasing the possibility of a larger number of users, and, consequently, of spreading and usability of the APP and of favoring behavior change. Marketing will take place through the dissemination of the APP in different contexts, such as scientific events, publications in journals and on social media before making it available on platforms for free. Although the use of the Internet by cell phones is growing exponentially, an APP that needs a network for its use can impact its usability. In this way, the application does not require a connection to run. Built by benchmarking and the use of the SCAMPER technique, a prototype of a multimedia APP emerged based on the needs of the end user (target audience) and scientific recommendations, while innovating what is already practiced in the market, to ensure usability and favor change of behavior.

Discussion

The SCAMPER technique allows, in its individual or group application, variation in the perception that innovative solutions are often new, through combinations of existing ideas, proposing new solutions resulting from additions or modifications to existing solutions. This builds on that insight, providing a checklist of answers and ideals to the questions posed⁹.

The SCAMPER technique was originally and widely used in the scope of companies to create new products. Now it has been used as training for creative thinking in various fields because it is not specific to certain aspects, but so that creativity can be activated in any field¹⁰.

There is a strong use in the field of education, through the development of research, especially comparative studies, which make use of pedagogical

interventions with SCAMPER, in comparison with other traditional teaching techniques in different disciplines of human knowledge.

In a study that compared the SCAMPER technique with the mind map in the process of creating multimedia resources, it pointed out that its use by students during the ideation process offered them a clearer path design and several options for brainstorming, compared to the other technique¹¹.

SCAMPER has also proven effective in developing students' mathematical creative thinking capacity, compared to the traditional teaching method¹⁰.

The SCAMPER technique has also been used as a pedagogical strategy to stimulate awareness regarding the collection and use of solid waste. After applying this in class to students of the natural science course, they reported that they started to recycle all solid waste, except organic¹².

SCAMPER has proven to be a convenient technique for developing creative thinking skills. In an intervention with teachers to deal with gifted students he pointed out that the use of this tactic increased the skills of creative thinking, especially for divergent thinking, as it also involves a variety of cognitive skills, such as information gathering, research, combination, flexible thinking, and resolution of problems¹³.

Application of the SCAMPER technique facilitates creativity and critical thinking to compose short stories and poems from primary school students. The results show that the technique has a significant impact on product innovation. This technique can be used to help students produce new and effective ideas, encouraging them to ask questions that lead them to think critically¹⁴.

Creativity and innovation are also present in the culinary practice of a chef. At all times, they are directly applying the SCAMPER tool when replacing technique or ingredient in the absence of product or food restriction; when they combine product flavors; when they adapt their old techniques to the circumstances; when they modify ingredients and manipulate in new forms and textures; when they put ingredients in another purpose; when they eliminate elements, causing new visual appeal and when they rearrange the presentation or main ingredient in a dish¹⁵.

SCAMPER involves the development of thought processes on a subject or object. In this technique, individuals are required to consider a single object and then find ways to change or improve that object by brainstorming⁸.

Using the SCAMPER technique, a mobile application called PedCare was created. This has been validated by nursing judges, information and communication technology professionals and end-users, proving to be valid and reliable for use in clinical practice as an educational technology to promote the care of the feet of people with diabetes. The usability of the APP was also measured by the end-users, in which an overall usability average of 96.1 points is observed. Which represents good usability of the application prototype. Users now strongly agree (level 70) and fully (level 80) with the evaluated items¹⁶.



Such results were achieved by rigorous scientific basis and by having pursued a radical technological innovation, using the SCAMPER idea generation technique as a tool.

Thus, the individual's creative potential for innovation is not something static, but something dynamic. For this, one must consider the socio-cultural and environmental context that it is inserted in.

Conclusion

The SCAMPER technique proved to be effective in generating ideas for the proposition of the APP due to its practicality, simplicity, and flexibility, stimulating convergent and divergent ways of thinking, through words that give rise to inquisitive answers as a basis for reasoning.

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