Original Article

Reliability and impact of user-centered social technologies in health: a new development proposal

Fidelização e impacto de tecnologias sociais em saúde centradas no usuário: nova proposta de desenvolvimento

Fidelización e impacto de tecnologías sociales en salud centradas en el usuario: nueva propuesta de desarrollo

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Abstract

Objective: To describe the methodology for developing user-centered social technologies in nursing/health

Methods: A technological development study that presents a methodological proposal for the expansion of social technologies, with a focus on solving problems arising from the demands of healthcare users.

Results: The technological application methodology was conceived and systematized in five sequential steps, namely: Situational diagnosis, Ideation and prototyping, Validation, Implementation, Reliability, and social impact of the application.

Conclusion: With this new technological development proposal, we intend to contribute to the reliability and impact of social technologies centered on health users' needs, based on approaches such as Design Thinking and User-Centered Design.

Resumo

Objetivo: Descrever metodologia para o desenvolvimento de tecnologias sociais em enfermagem/saúde centradas no usuário

Métodos: Estudo de desenvolvimento tecnológico que apresenta proposição metodológica para a expansão de tecnologias sociais, com foco na solução de problemas oriundos de demandas dos usuários de saúde.

Resultados: A metodologia de aplicação tecnológica foi concebida e sistematizada em cinco fases sequenciais, quais sejam: Diagnóstico situacional, Idealização e prototipagem, Validação, Implementação, Fidelização e impacto social da aplicação.

Conclusão: Pretende-se, com essa nova proposta de desenvolvimento tecnológico, contribuir para a fidelização e o impacto das tecnologias sociais centradas nas necessidades dos usuários de saúde, a partir de abordagens como o *Design Thinking* e o *Design* Centrado no Usuário.

Resumen

Objetivo: Describir metodología para el desarrollo de tecnologías sociales en enfermería/salud centradas en el usuario

Métodos: Estudio de desarrollo tecnológico que presenta una proposición metodológica para la expansión de tecnologías sociales, con enfoque en la solución de problemas originarios de demandas de los usuarios de salud.

Resultados: La metodología de aplicación tecnológica fue formulada y sistematizada en cinco etapas secuenciales, a saber: Diagnóstico situacional, Idealización y creación de prototipo, Validación, Implementación, Fidelización e impacto social de la aplicación.

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Conflicts of interest: nothing to declare.

Conclusión: Con esta nueva propuesta de desarrollo tecnológico se pretende contribuir para la fidelización y para el impacto de las tecnologías sociales centradas en las necesidades de los usuarios de salud, a partir de intervenciones como el *Design Thinking* y el *Design* Centrado en el Usuario.

Introduction

Innovation as a strategic tool for social development has gradually received special attention in many different areas of knowledge. It refers to implementing ideas that result in the introduction of new services, methods, techniques, management systems, and others.[1-3] In this sense, innovation is an indispensable determinant of a country's socioeconomic development and, therefore, stimulated by national and international funding agencies.

Besides invention, this requires resources and skills to produce applicable, user-oriented products that can be sustained over the long term in order to add individual and collective value.[4,5] Research shows that although technological innovation is a priority for a country's economic and social development, it cannot be reduced to knowledge transfer and/or encouraged for merely utilitarian purposes.[6]

Social technologies developed in the interaction with the community are part of this evolutionary path. These are characterized as interactive and associative tools developed in the interaction with the community that represents effective social transformation solutions. Social technologies portray, under this approach, a type of inclusive solution that, allied to *Design Thinking*, aims to generate shared and collegiate ideas, from multidisciplinary groups focused on problem-solving.[7,8]

Developing a social technology, therefore, involves a unique and multidisciplinary construction process that arises from immersion in reality and synergy with the user as someone who enjoys this social asset.[9] According to this approach, in addition to specific skills, innovation involves a methodological process involving at least four or more sequential stages, ranging from conception, project development, verification testing, and feedback adjustments.[10-12]

In Nursing/health care, innovation has been a driving and strategic component to support the development of new products and processes and, consequently, to qualify the performance and results of services.[13] Based on this perception, this study's centrality is not only in contributing to the technical and technological advancement of nursing/healthcare but in presenting a new development proposal focused on the reliability and impact of social technologies in health aligned to the users' needs.

Here, the user is understood in the light of systemic references, as an active and participatory subject in health production. And health, as a dynamic system, singular and self-organizing, interconnected to the different social systems that seek to promote healthy living for individuals, families, and communities.[14]

We seek to transcend traditional references of health technology development to present a prospective vision of technical and technological knowledge as a common good and the ability to produce it with responsibility and social commitment. Expanding this possibility requires transcending unilateral and reductionist approaches to technological production, in order to enhance and strengthen the different social, political, and economic structures that make up the innovation system of a knowledge area. To this end, we aim to describe a methodology to develop user-centered social technologies in nursing/health care.

Methods

This is a technological development study that describes a methodological proposition for the expansion of social technologies, focused on the problem-solving arising from the demands of health users. This methodology was developed in the context of a Nursing/Health Professional Program in southern Brazil. The study integrates the University research project "*Incubadora de Aprendizagem*".

The University Research Project "*Incubadora de Aprendizagem*" was institutionalized in a University Teaching Hospital in 2012, aiming to add technol-

ogies to the Nursing and healthcare process. The Learning Incubator is configured, in this concrete space, as a teaching and learning technology, capable of empowering talents, promoting critical-reflective thinking, and intuitive propositional actions in the daily lives of health professionals.[15]

The present technological development proposal, conceived in five sequential steps, will be detailed in the results item. This proposal aims to continue the "entrepreneurial management technology for Nursing/health care" validated in its theoretical and conceptual dimension, entrepreneurial qualities, and methodological path systematized in five steps.[16] This new proposal for technological development is intended to centralize the reliability and impact of social technologies aligned to the needs of healthcare users. The criteria proposed by the Coordination of Improvement of Higher Education Personnel (CAPES)[17] are considered throughout, namely: replicability, comprehensiveness, complexity, innovation, stage/maturity, potential to transform reality, as well as good technological order practices, such as: conduct outreach visits; ensure the participation of the academic and productive sectors in developing the proposal; document all steps and justify the decisions adopted throughout the process; disseminate the information; conduct budget planning, confirming the project's funding sources; and, if necessary, (re)define measures to deal with delays in public resource transfers.[18]

In parallel, we considered the expertise of the researchers who proposed this new proposal for technological development, who are located in several areas of knowledge and have experience in developing products and technical and technological processes in a Professional Nursing Program. In addition to the existing methodologies in the scientific and technological field, we felt the need to carry out a new proposal for technological development in health, based on social technologies and *Design Thinking*.[19]

In addition to the systemic-theoretical dimension and the entrepreneurial qualities required to develop social technologies, with a broad reach in nursing/health, the User-Centered Design referential was considered.[20] Design encompasses a problem-solving process centered on the user, oriented to innovation, and defined by strategic, participative, and transdisciplinary biases. It embraces, in the same way, a creative synthesis of technological, economic, strategic, ethical, social, and environmental values in development, capable of reconciling the actors' interests in innovation and the users' protagonism.[20] This thinking and innovation is intended to expand creative, critical, and systemic thinking, and to strengthen the role of users in generating shared and collegiate solutions to complex health problems. This methodology focuses, therefore, on solving rather than on identifying and exploring health problems.

Results

The new technological development proposal was conceived and systematized in five sequential steps, which had as their theoretical basis systemic referential aspects and social entrepreneurship and, as a methodological basis, User-Centered Design and Design Thinking. These approaches aim to place the user as the protagonist throughout the entire development process of innovative products and processes. The methodological steps of the new proposal are characterized as follows: Situational diagnosis, Idealization and prototyping, Validation, Implementation, Reliability, and social impact of the application, as shown in figure 1. The new technological development proposal involves a circular, interactive, and associative process, in which continuous feedback from users is the driving force behind the strategic gear. Along this path, the designer/researcher's objective is not limited to the surface, in other words, to collect and explore investigative interest information, but in the ability to empower the user as a protagonist for achieving creative and collegiate solutions concerning previously identified problems. The aim, of this idea, is to contribute to the empowerment of health users, in order to make them even more protagonists of their lives and health conditions, as well as interdependent on public policies in general.

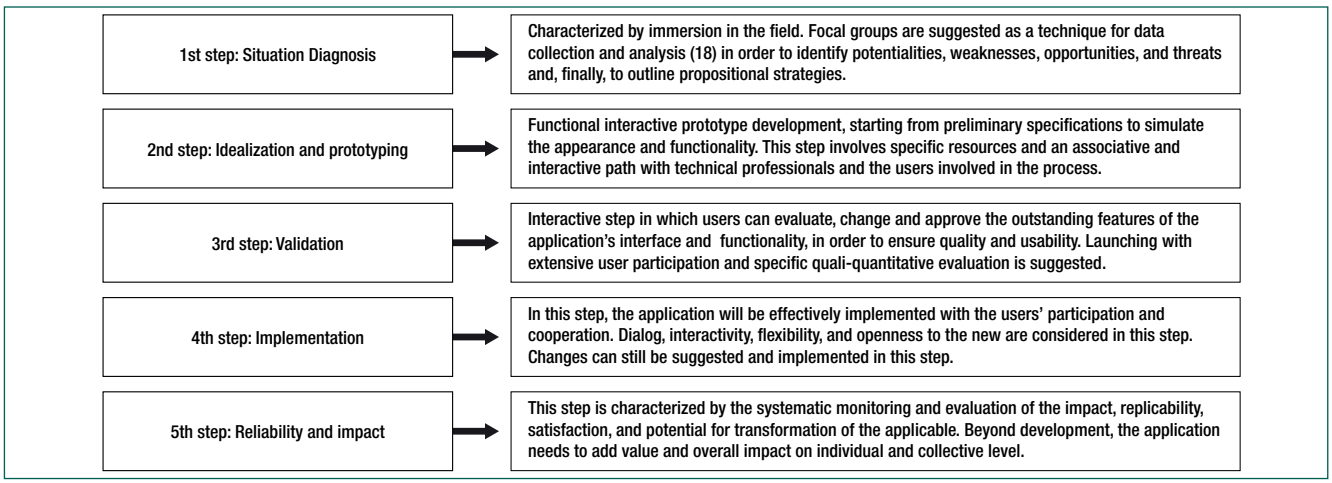

Figure 1. Methodology for developing social technologies in nursing/health

The new technological development proposal, with characteristics of social technology, consists in placing the health user at the center of strategic decision-making for previously identified and explored problems. Thus, the methodology's first step concerns Situational Diagnosis, which is characterized by the insertion of the designer/researcher in the field. From the focus group as a technique of data collection and analysis[21] and/or other techniques, it is suggested to identify the potentials, weaknesses, opportunities, and threats related to the object under investigation, in order to discuss and prospect strategies that meet the users' needs. And, by respecting the users' needs, it aims to consider the particularities, habits, and expectations of a specific group of people and, in this way, add value locally, but with a global reach.

In Idealization and Prototyping, the second step, the prototype must be developed in an interactive and collegiate way, from initial specifications of appearance and functionality. In this stage, specific resources are involved and an associative and interactive path with technical professionals and health users is encouraged. At this stage, it is important to highlight the relevance of the user's insertion as a proposing agent of new ideas and solutions for the demands previously identified.

Social technology centered on the protagonism of the user allows the creation of democratic and co-responsible interfaces, in which the singularities and multidimensionalities of each human being in the individual and the collective are considered. To do so, the designer/researcher must, first of all, have human and social skills, capable of aggregating, connecting, valuing, and empowering initiatives and talents. The designer/researcher must be able to explore, with creativity and flexibility, different problem-solving strategies and choose those that best meet the requirements of the situation/reality under investigation. Furthermore, the designer/researcher must have the ability to not only synthesize solutions that satisfy certain requirements but to invest their time and efforts in creating alternatives and prospecting strategies that drive innovation and transformation, able to solve previously explored problems.

By focusing the technology on the health user, the researcher as the designer becomes a mediator in developing social technologies and, under this approach, the relevance and usefulness of this technology depend on the utility that the user starts to see when trying to satisfy a given need or problem. When considering that nursing/health problems are increasingly complex, the environments/services need to be more dynamic, interactive, and the solutions more agile and shared.

For social technology to present relevance and applicability, it becomes necessary for technology Validation, the third step of the proposed method. This step is characterized as interactive, in which the user will have the possibility to change or approve the interface characteristics and the intervention

functionality for quality assurance and usability. Qualitative and quantitative validation tools can be used by the designer/researcher. We emphasize that effective validation enhances the relevance of the social technology, besides contributing to the implementation process.

Implementation, the fourth step of this path, suggests users' active participation. Principles such as dialogue, flexibility, interactivity, and openness to the new/different are essential in this stage, and will surely contribute to the replicability, comprehensiveness, and social impact process. It is important to consider, in the implementation path, horizontal and collegiate approaches, in which all players figure as protagonists of a new story. Changes can still be made in this development path.

The fifth and last step, Reliability and Impact, is characterized by systematic monitoring and evaluation of the impact, its replicability, satisfaction, and the transformative potential of the social technology, by constructing new instruments. This step of methodological finalization for developing user-centered social technologies will demonstrate a prospective movement of social practices transformation, based on the protagonism of different actors involved.

Given the exponential advance of new technologies, agility and user reach extension, new investments, and interlocutions, Reliability has become indispensable. It is not enough to develop new technologies, it is necessary that the user feels attracted, motivated, and enchanted to satisfy their demands, in order to make them loyal to the transformation process. It is essential, therefore, to add value to what is offered, to produce collective movements, and to excel in ethics and transparency in relationships. The question is, how can we make the Unified Health System user loyal to self-care and health promotion strategies?

The new technological development proposal in question does not aim to point solutions but to present a path capable of unveiling new ways of thinking and acting collectively, in other words, involving professionals, technicians from diverse areas of knowledge, and healthcare users. In this relationship, there is not a ready-made path, but a route to be taken through dialogue, empathy, trust, and proactive and entrepreneurial leadership. The benefits to be achieved, under this impulse, will result in innovation, satisfaction, impact, social commitment, and, above all, in improving health users' quality of life.

Discussion

The desired success in the technological and globally competitive market requires, from the different knowledge areas, a differentiated set of skills, competencies, and good technological ordering practices.[18] A study shows[22] that among the main skills required is *Design Thinking* and among the main skills demanded for the 21st century is the competence for community living, although no less important are the transversal, critical, digital, ethical, and environmental skills.

From this logic, we speak of technology as a social good. Therefore, its result must necessarily revert into common good for improving economic, social, and health conditions.[23] Thus, the ability to generate knowledge and translate it into new products or processes is a key instrument for growth and economic and social development.[6] Concrete efforts are needed, however, to empower researchers to develop their capacity to produce rather than just consume knowledge and applications disconnected from users' needs.[24]

CAPES stimulates, in this direction, the development of user-centered social technologies[17]. Social technologies are a set of activities developed through a collective organization, development, and application processes that can combine popular knowledge, social organization, and technical and scientific knowledge. Among their purposes, social technologies aim to foster social inclusion, user protagonism, and improved quality of life through planning, research, development, and knowledge dissemination in practice.

Parallel to the development of social technologies is user-centered design techniques, aimed at linking knowledge, goods, and services to the us-

ers' pressing needs. These strategies will be fundamental to producing an intelligent interlocution system that can satisfy needs and generate greater satisfaction, usability, staff productivity, and added economic and social value.

Techno-scientific knowledge cannot, under this prospective impulse, be developed for merely consumerist and utilitarian purposes, in other words, to satisfy market interests, but rather to promote the common good and the quality of individual and community life.[25] If scientific-technical knowledge is a social asset, science should be harnessed and stimulated to promote social and economic progress; and technological innovation should be seen as an integral part of development strategies at a macro level and not just at a micro, individual level.[26] Adopting such a systemic approach requires, however, some reflective questions: Are the scientific and technological skills and competencies that we foster and develop in Professional Programs contributing to improving people's quality of life? Who is interested in the technologies that are developed in Health Professional Programs?

Efforts to answer the proposed questions have been scarce. A study shows[27] that numerous structures and models have been proposed for the development of social technologies, but there is little evidence of what, for whom, and under what circumstances these are effective, which means that the desired impact and reliability have not been achieved. There is a need to identify mechanisms that contribute to achieving the expected results and meeting the real users' needs, in order to add value and generate broad social impact.

Designing a technological development proposal that systematically establishes a user-centered methodological path appears as a promising strategy for social development, not only for defining a critical approach and guiding its process, tasks, and results but also for facilitating interprofessional communication and broadening the perspectives for solving previously demanded problems. The technological development proposal, in question, can provide records and other graphic documents that allow the development team to access them for future developments.

If, traditionally, the user had to adapt to be able to use the productions developed in the academic field, today the direction of this force has been inverted. Public policies and funding agencies tend to value and support, increasingly, the technological development whose course values and inserts the user as an active and protagonist subject in solving their problems.[28,29] This new look at the technology development tends to benefit not only the users but also the services and the designers/researchers themselves, in order to facilitate access and ensure usability and sustainability of productions in the long term.

This study's main contribution to nursing/health science is related to the proposition of a new technological development proposal in the scope of Nursing/Health Professional Programs. It is a pathway conceived and outlined in five sequential steps, but which presents as unprecedented the 5th Step: Reliability and Impact. In this step, characterized by systematic monitoring and evaluating the impact, replicability, satisfaction, and transformation potential, the intention is to add value and generate impact and long-term technological sustainability. We also intend to demonstrate that nursing is capable of articulating knowledge and areas, as well as unveiling new theoretical-methodological possibilities capable of fostering interprofessional technological innovation.

This study's limitations include the limited expertise of nursing/healthcare researchers in developing social technologies in health, although this process has been increasingly stimulated by CAPES and the Brazilian health system.

Conclusion

This new technological development proposal is intended to contribute to the reliability and impact of social technologies centered on health users' needs, based on approaches such as Design Thinking and User-Centered Design. Producing tools to develop social technologies involves, therefore, circular and

dynamic methodological paths. It involves changes in focus, perception, and outlook by the designer/researcher and the user. It involves resources, skills, and attitudes focused on problem-solving. It requires, finally, collaborative and prospective constructions centered on the user as the protagonist of their own history.

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Collaborations

Backes DS, Smeha LN, Zambelran C, and Jobim FB collaborated in the conception of the project, data collection, analysis and interpretation, writing of the article, relevant critical review of the intellectual content, and final approval of the version to be published. Rodrigues Jr LF collaborated with the writing of the article and relevant critical review of the intellectual content and final approval of the version to be published.

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