



# REVISTA INTERDISCIPLINAR DE PROMOÇÃO DA SAÚDE

## INTERDISCIPLINARY JOURNAL OF HEALTH PROMOTION

Volume 1 - Número 1 - Janeiro/Março 2018

<http://dx.doi.org/10.17058/rips.v1i1.11945>

ARTIGO ORIGINAL

## Informatics applied to health evaluation and promotion: online platform for filling in questionnaires

### *Informática aplicada à avaliação e promoção da saúde: plataforma on-line para preenchimento de questionários*

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#### ABSTRACT

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priscilla-rayanne@hotmail.com **Objective:** this study was conducted with the objective of developing and evaluating a computerized platform for health promotion for workers of the Instituto Federal Goiano Campus Ceres. **Method:** the system was developed using markup languages (HTML, CSS) for presentation and styling of the interface and programming languages (PHP, JavaScript) for forms data management, connecting to the database, and dynamic user-system interaction. The graphic framework Bootstrap was also used to increase the visual aspect. The main tools employed were the following: Atom (for code editing); FileZilla Client (for FTP files maintenance); and phpMyAdmin (for database management). The system was evaluated by means of a questionnaire created for this purpose, which was completed by 41 workers. **Results and conclusion:** the results indicate that the platform is useful, innovative, and applicable to various worker populations. Health informatics is a continuously expanding area. Thus, efficient and effective information collection and maintenance systems are essential.

**Keywords:**  
*Medical Informatics;*  
*Public Health Informatics;*  
*Online Systems;*  
*Surveys and Questionnaires.*

#### RESUMO

**Objetivo:** o objetivo desta pesquisa foi desenvolver e avaliar uma plataforma informatizada de promoção de saúde aos servidores do Instituto Federal Goiano Campus Ceres. **Método:** o sistema foi desenvolvido por meio de linguagens de marcação (HTML, CSS) e programação (PHP, JavaScript), que foram responsáveis por apresentar e estilizar a interface, gerenciar dados de formulários, conectar com banco de dados e dinamizar a interação usuário-sistema. Foi também utilizada o framework gráfico Bootstrap para incrementar o quesito visual. As principais ferramentas utilizadas foram: Atom – edição de código; FileZilla Client – manutenção de arquivos FTP; e phpMyAdmin – gerenciamento do banco de dados. A avaliação do sistema foi feita por meio de um questionário desenvolvido para esse fim, o qual foi respondido por 41 servidores. **Resultados e conclusão:** identificamos que a plataforma foi útil, inovadora e aplicável a outras populações de servidores. A informática em saúde é uma área que se expande a cada dia, neste sentido, surge a necessidade de averiguar a importância de sistemas aplicados a esse fim.

**Palavras-chave:**  
*Informática em Saúde;*  
*Informática em Saúde Pública;*  
*Sistemas On-line;*  
*Pesquisas e Questionários.*



## INTRODUCTION

Working environment degradation is one of the most serious consequences of reformulation of the world's production structure. This reform of working conditions has occurred as a result of various technologies and social relations. Consequently, the range of vulnerabilities of workers—from lack of health protection to issues such as social security reform and revocation of labor rights—has expanded. These facts are responsible for the worsening of the world's quality of life, which increases the need for protection of workers' health.<sup>1</sup>

In this context, there are several studies on the causes,<sup>2</sup> consequences,<sup>3,4</sup> and solutions<sup>5,6</sup> for the deterioration of employees' health. Musculoskeletal disorders resulting from daily activities are among the main problems that afflict this population and, together with the prevalence of low back pain, it is becoming an epidemic.<sup>7</sup> In the school environment for example, teachers work under unfavorable conditions in which they use their physical, cognitive, and affective abilities to meet the demands of schools, which generates an excess of effort and demand on their psychophysiological functions.<sup>8</sup> These conditions have repercussions on the teachers' physical and mental health, which affect their professional performance.<sup>9,10</sup>

Considering this, the use of new strategies in the health area has become urgent. Buss<sup>11</sup> *apud* Inglesias and Dalbello-Araújo<sup>12</sup> stated that “the promotion of health is based on the participation of the subjects and on the intersectoral articulation of public power for the collective transformation of the problems that affect the community.” Strategies based on the involvement of the population have better answers because they raise people's awareness. There is also a strategy for health promotion with the use of modern technologies.

Various technologies have been grow and are now present in most sectors of society. According to Farias *et al.*<sup>13</sup>, in the medical field, technologies have been following the rapid development of the world today, justified by the “inherent need to improve health care for the population.” There are several examples of health technologies in operation, as stated by Schwonke *et al.*<sup>14</sup> and Ribeiro, Costa and Santa Rosa,<sup>15</sup> they have an impact on medicines, equipment, technical procedures, organizations, educational

systems, and in program and assistance protocols. One of the major technological advances highlighted in the area of health is the use of information technology through *software*.

Pressman<sup>16</sup> notes that *software* “includes executable programs on a computer of any size or architecture, content, descriptive information in both printed and virtual form, covering virtually any electronic media.” Throughout the years, diverse knowledge, technologies, and scientific experiments have contributed significantly in the health area. Among the improvements brought by *software* to its users are speed, organization, and data security.

Thus, health informatics is defined as “the area of knowledge that deals with the application and use of automation tools for data processing in various segments of activities related to the health of the individual and of the community.”<sup>17</sup> Pinochet<sup>18</sup> comments on the importance of advances in the health sector. According to him, technology has overcome barriers, which do not only involve standard and administrative processing, but also play a crucial role in patient care. Évora<sup>19</sup> and Lopes and Araújo<sup>20</sup> mention three categories of health technologies: “biomedical technology, which uses complex machines and equipment in patient care; information technology, which refers to the electromechanical matrix used to manage and process information; and the technology of knowledge, which uses electronic devices between the patient and the nurse in order to induce technical practice.” This research is focused on the technology of knowledge.

Therefore, in the current study, the aim was to develop and evaluate an online platform for filling out health questionnaires. These questionnaires have questions regarding the health status of the workers of the Instituto Federal Goiano, Campus Ceres, and include topics such as eating and posture habits, physical activity, life at work, quality of sleep, and quality of life.

## METHOD

The requirements that the *software* would need to meet were initially defined: enable the questionnaires to be filled out by the workers, allow simple navigation, and facilitate easy access to an efficient database. The second stage of the project started with the system development. The text editor

*Atom* was used for encoding.

The first interface was created using only HTML (*HyperText Markup Language*) and CSS (*Cascading Style Sheet*) markup languages, but the graphic framework *Bootstrap* was implemented soon afterwards (Figure 1) shows the difference between the first system interface and the current interface, which makes use of the *framework*). The PHP programming language (*Hypertext Preprocessor*) was used to connect the system to the database, and JavaScript to make the interaction between the user and the system more dynamic. The free web hosting service *Hostinger* was used to host the system on the global network, and provided tools such as *phpMyAdmin*, which is essential for database control and management. The *FileZilla Client* was used to send and maintain hosted files (FTP - *File Transfer Protocol*).

The website was developed in line with the principles of *Software Engineering*: specification: determination of requirements and needs that the system should meet; development: creation of the system in the form of lines, which is also called coding; validation: repetitive tests performed on the platform simulating possible user interactions (including tests of vulnerabilities from intentional errors); and maintenance: constant correction of code flaws and possible problems.<sup>21</sup>

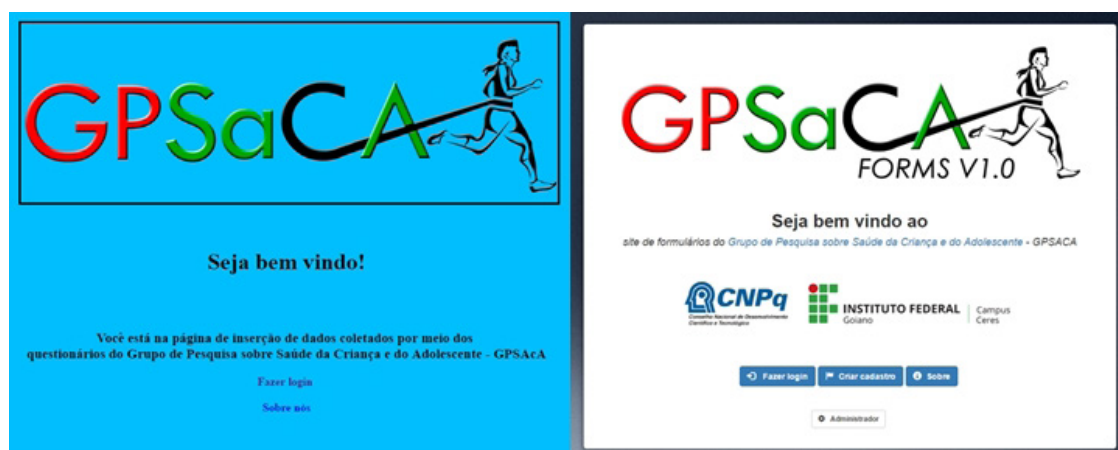
In order for the worker to be able to fill out the questionnaires, he/she has to register and verify their email address (the system sends an automatically generated code to the address entered, which the worker has to copy and insert into the activation page). The questionnaires were organized for the users in the same manner as they were for the administrator, with the exception of the Anthropometric Assessment

(because it asks for information that the researchers collect) and the BackPEI-A Questionnaire, which is available in a different version for each gender. These questionnaires requested information from the workers such as posture and eating habits, muscular pains, frequency of physical activities, life at work, quality of sleep and of life, and health in general.

The evaluation of the system was conducted through a 10-item questionnaire developed for the purpose. The questionnaire also enabled the workers to evaluate aspects such as ease of navigation, system assistance, type of filling preference, and innovation of the research proposal.

Approximately 250 workers were invited to participate in the survey. Fifty-five (22%) chose to participate, of which 41 completed the questionnaires. The invited population included outsourced workers (cleaning, kitchen, surveillance) and workers of the institute (teachers and administrative staff). All participants voluntarily agreed to participate in the research and signed an Informed Consent Form. This project was approved by the Research Ethics Committee of the Federal Institute of Goiás (no. 035/2014).

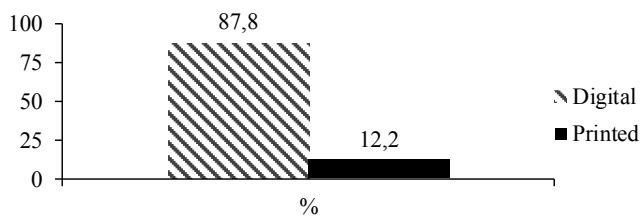
The website was made available through a link provided by the Social Communication and Events Center (ASCOM) of the Federal Institute of Goiás, Ceres Campus, which sent an email inviting all the workers of the campus to participate in the project, which had information and the address for accessing the system. Visits to the sectors of the Teaching Institution were also made in order to publicize the project. The descriptive statistics through SPSS was used for data analysis.



**Figure 1** - (Left) First version of the homepage of the website in October 2016. (Right) Current version of the interface.

## RESULTS AND DISCUSSION

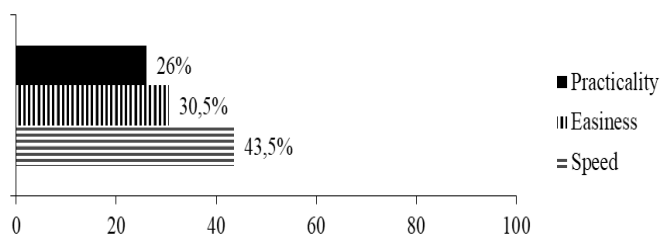
Forty-one workers from Ceres Campus were evaluated. The results indicate that 95% of them felt satisfied with the assistance delivered by the website and 85% classified the proposed digital questionnaires as innovative. The results regarding preference for the type of questionnaire are presented in Figures 2 and 3, respectively.



**Figure 2** - Preference for type of questionnaire forms.

The results show that the system met the requirement for ease of access because of its good reception and ease of navigation. The computerized questionnaires were considered organized, whereas formatting and alignment errors are commonly found in printed versions. More than 95% of the workers evaluated said they were satisfied with the assistance delivered by the website, which proves its self-sufficiency. More specifically, the participant were pleased that they could complete the questionnaires wherever they wanted, without necessarily having the presence of a researcher.

In addition, more than 85% of participants preferred to fill out the digital questionnaires instead of printed questionnaires. Among the main reasons cited for this preference were speed, practicality, and ease of use (Figure 3). This information demonstrates that the system is useful because it accords with the tendency of the evaluated people, in addition to revealing that almost all of them are aware of the advantages of digital form filling.



**Figure 3** - Main reasons for the preference for digital form filling.

Comments regarding paper and ink economization, error prevention, and enhanced privacy were also proffered. In this sense, it was noted that approximately 1250 sheets of paper were saved during the research, which would have been needed to print the questionnaires. Error prevention is also another advantage, as whatever is typed on the computer can be erased with the press of a key. Further, enhanced privacy exists because once the user finishes filling out a questionnaire, his/her answers are sent to a database to which only the researchers have access. This is unlike paper, in which case anyone who has access can read the information that it contains.

From this perspective, Ekman and Litton<sup>22</sup> and Faleiros *et al.*<sup>23</sup> have mentioned that the traditional data collection strategies of research participants, such as face-to-face or telephone interviews and printed questionnaires, seldom produce results that are quick and cost-effective, in addition to not following “the technological tendency and dynamics of the population.” Therefore, when 3.8 billion people or 51% of the world’s population have access to the Internet<sup>24</sup>, researches using the virtual environment will be a trend for data collection, which is preferred by most research participants.

The time to complete the questionnaire was considered long by a little over 40% of the participants, whereas approximately 60% found it short. There were also comments about the filling time being still lengthy (contrary to the idea that making things digitally available means speed). However, in reality, the main objective of making the questionnaires digitally available was not to reduce time, but to conduct a deeper evaluation as well as make it easier for the workers and the researchers.

## CONCLUSION

Analysis of the study results showed that the system was predominantly considered innovative, because it is useful for health promotion. This was confirmed by 95% of the workers, who were satisfied with the assistance delivered, including more than 90% who considered the interface easy to navigate. Further, the virtually unanimous preference for digital form filling verified its utility.

The dissemination and use of information technology in the area of health is vital because it is an extremely powerful tool. With the accomplishment

presented in this paper, it is clear that the use of technologies will have a significant impact both in scientific research and in the area of health.

## ACKNOWLEDGEMENTS

We thank the National Council for Scientific and Technological Development (CNPq - <http://cnpq.br>), and the Instituto Federal Goiano (<https://www.ifgoiano.edu.br/>) for scholarships.

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Recebido em: 23/12/2017

Aceito em: 06/03/2018

**Como citar:** CAMARGO, Guilhermy et al. Informatics applied to health evaluation and promotion: online platform for filling in questionnaires. *Revista Interdisciplinar de Promoção da Saúde*, Santa Cruz do Sul, v. 1, n. 1, jan. 2018. ISSN 2595-3664. Disponível em: <<https://online.unisc.br/seer/index.php/ripsunisc/article/view/11945>>. Acesso em: 01 janeiro 2018. doi:<http://dx.doi.org/10.17058/rips.v1i1.11945>