

Personalized Web platform for education in healthy lifestyles

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Abstract

One of the main difficulties faced by public health management in developed countries is the aging of the population and, consequently, the growing of chronic diseases. Those diseases “contributed approximately to 59% of the total reported deaths in the world and 46% of the global burden of disease”. Many of them could be easily prevented improving aspects like therapy compliance, healthy lifestyle, personalised information and patient motivation. This paper contributes to solve this situation by presenting a Web tool that provides the user with information to improve and control his own self-care, through the use of the e-learning technologies. The user is also motivated to take control of his decisions regarding lifestyle.

Keywords:

Motivation on self-care, prevention and promotion strategies, public health, personalization, portlets.

1. Introduction

Most of the health policies in the European Union, remark the importance of continuous health promotion and prevention and focus on actions to improve the early detection of health crisis situations [1] (such as the recent avian flu cases in Asia). The World Health Organization (WHO) states that, “chronic diseases are, for the most part, entirely preventable. Countries and people could save precious lives and healthcare resources by investing in preventing these diseases. [...] We should all be ready to move for health and to adopt healthy and active lifestyles” [2].

Near 80% of the cardiovascular diseases, diabetes mellitus type 2 and the 40% of the cancer incidence could be prevented by mean of a nutritious diet, regular exercise and the cessation of tobacco use. However, the individual is each time more responsible

of his own life quality improvement, making motivation and easy access to information – as well as the confidence on it – the main pillars of health promotion.

Accordingly, it is a key matter to convince citizens that being responsible of their own health brings advantages [3] to their health. Being well informed about health related issues and the services offered by the institutions result in a greater independence and better control of their own life, as well as a guide for a more effective use of such services. Moreover, health care related information is necessary in a wide variety of circumstances and situations. Being able to guarantee the user the quality and appropriateness of the information received is of prior relevance to promote this responsibility. In this sense, the Internet provides a new reliable, interactive medium that is accessible for the great majority of the European population.

Thus, e-health systems providing the user with personalised information must be studied and implemented in order to encourage him to incorporate healthy lifestyles in his daily life. Within these systems, motivational aspects need to be seriously taken into account and the way the information is presented must be carefully analyzed. The latter is of particular importance, as users often are not familiar with new ICT. Hence, interfaces must be user-friendly, understandable and transmit information in such a way that motivates the user to perform a change towards a healthy lifestyle

The aim of this work is on the first hand, provide users with a training platform that provides personalized information and, on the other hand, motivate them to use an e-health system in order to create healthy routines. This would provide them with means for taking control of their lifestyle and manage their self-care. The development of such a system is based on the personalization of information, adapting it

to the specific needs and characteristics of the user.

The process begins by harvesting statistical data using common and specific questionnaires, specifically designed for this process. This helps classifying the user regarding several parameters, for example: the specific pathology (obesity, diabetes, etc.), the attitude to change healthcare habits, etc. Only the information related to the specific problematic is used (to “modulate” the content), adapting the presentation of the results (to “modulate” the tone, the format, etc.) and recommendations according to their healthcare behaviour state, and other key parameters (such as user’s profiling and main pathology, e-health position, etc.).

This paper presents a practical example of such platform, implemented using “portlets”, a novel Web component based on Java technology that returns dynamic content to user requests [4], allowing the highest possible degree of personalization. The use of new web design technologies, such as Flash [5], increases also the platform’s dynamism and interactivity.

Information of very diverse sources is provided by the platform. In order to personalise this information, users are enquired about the information content and layout preferences. The application selects, according to a set of algorithms, the specific information to be presented to each user.

A novel, dynamic tool that allows a high degree of personalisation is presented. This tool instructs and motivates citizens to improve their lifestyle habits, by presenting high quality and personalised information.

2. Materials and methods

Personalised Web platform aims at developing environments adapted to the users according to their personal characteristics and preferences. The presentation of the information relevant to the user is divided in five steps [6]:

- **Step 1: Analysing the problem to be addressed and understanding its determinants.**
- **Step 2: Developing an assessment tool to measure a person’s status on these determinants.**
- **Step 3: Creating tailored messages that address individual validation of determinants of the problem.**
- **Step 4: Developing algorithms to link responses from the assessments into specific tailored**

messages.

- **Step 5: Creating the final health communication.**

This paper focuses on step 4 consisting of the development of algorithms for the provision of personalised information through a Web platform. This is achieved by means of a Web platform. This solution has an additional advantage, since it makes such information available to the user through the Internet. For this purpose, different innovative technologies relative to dynamic Web development have been analysed, such as Java Portlet [7], JSP, Oracle databases, HTML or Macromedia Flash. The selection of these technologies is based on the following requirements: interactivity, personalisation, portability and usability, as well as a potential seamless integration in any kind of system.

The whole process described in step 4 consists itself of five different stages. In each stage, different technologies have been selected to achieve the required functionalities of the full system. These stages are: Login, Questionnaires, Personalisation, Storage and Presentation.

At the **Login** stage the user’s individual information is recalled from the database records, which have been previously stored in the general profiling process.

The **Questionnaires** about health behaviour and e-health attitude have been developed in JSP technology. Their functionality is to define the users’ main concern and to discover their motivation status regarding their health [8] and their attitude towards new ICT. The previous steps have been already used to provide required methodologies to classify the user into each stage, and to suggest appropriate motivational techniques for them.

The **Personalisation** stage adapts the information to be delivered to the user. The user’s profile is modified after the questionnaires are filled in. Thus, the system is personalised according to the user’s preferences and completed with the most suitable information.

The **Storage** stage responds to the need of storing the users’ profiles, with all the corresponding security and coherence requirements, to be later used all along the session.

Finally, at the **Presentation** stage the personalised information and recommendations according to the results of the previous stages are presented to the user. The information shown has been selected in collaboration with health professionals. To model the information provided, the structure of a standard

medical intervention for a user suffering any of the different pathologies studied has been modelled with the guidance of healthcare professional.

3. Results

The Web platform described has been implemented with the following features:

- 1 To offer personalised information in form, tone and content.
- 2 To be visual, dynamic and interactive.
- 3 To be able to be integrated in an e-learning system.

In this sense, a training activity consists of a multimedia session through the Internet and presented by means of a visual and friendly interface. In particular, the implemented tool is a portlet using many of the characteristics of the specification JSR 168 [9], providing the user a three modes portlet: VIEW, EDIT and HELP.

Figure 1 shows the VIEW mode that allows the user to enter his login data. These data are matched against the ones stored in the database to authenticate the user. If they coincide, the user is presented the questionnaires regarding health behaviour and attitude regarding e-health, so he can be classified into a corresponding stage.



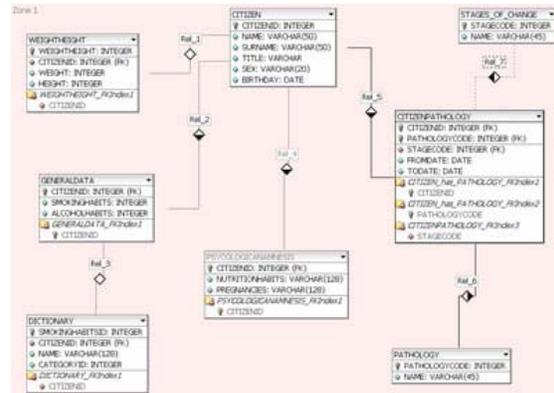
“Figure 1. The authentication page of Training”

The EDIT mode allows the user to select among diverse presentation styles defined by the administrator. The HELP mode allows the user to access a complete documentation to improve the system’s usability.

Once the user has been classified regarding his attitude towards healthcare, this information is stored in the database and personalised information is presented in terms of form, tone and content. The

personalisation process is performed by using techniques that, using the adopted methodology [8], are the most appropriate to instruct, to convince and to motivate users to improve their lifestyle. Therefore, users’ awareness to take control of their own health and to be co-responsible of it, is raised. In this sense, only relevant information in the appropriate mode (language, tone, etc.) is delivered to the user through a personalised interface (avatar, colours, video, images, etc.).

The database has been structured to offer three different types of information about the user: profile, lifestyle characteristics and behaviour towards health and e-health status. The latter is the most important since it can be dynamically changed every time a user accesses the system and modifies any aspect related to his health behaviour. In this way, if the user has not changed the information introduced in previous sessions, the results displayed by the system reflect the user’s needs and motivation. The information stored in the database can be modified by the administrator in order to improve system’s quality, by adding new information or modifying the existing one. Information in the database must observe confidentiality and security requirements. All these requirements of structure, integrity and coherence suggested the use of a well known and established relational database such as Oracle.



“Figure 2. The Training database”

One of the main advantages of this tool is its portability, due to the use of Portlets, implemented as Web files (.war) that can be deployed by a Portlet container (i.e. Pluto portal [10]) being, at the same time, their content independent from it. The Portlet container calls the portlets through the Portlet API in order to retrieve its content through the Container Invoker API. Therefore, the tool developed can be used in any other platform without the need of introducing any modification.

4. Discussion and conclusions

The health sector is experiencing a huge revolution due to the proliferation of applications that appear as consequence of the convergence of the technological, information and communication sectors, such as the comprised into the group of healthcare services known as e-Health. The main objectives of such services are to empower, benefit and improve the health related activities. The existence of information easily reachable by means of tools like the one presented in this paper enables a more fluent professional/patient relationship, since both parts have access to the same resources to be informed about diagnostic, therapy and prognosis. Of course, such tools will never substitute the role of the doctor in diagnostics and therapy, but help patients in raising awareness of their conditions and encouraging them to assume healthier lifestyles.

Health professionals emphasize the importance of motivation in improving the lifestyle of the individual. This tool tries to serve as a guide to the user through the different stages of motivation described in the e-health model [9] until the desired healthy behaviour is assumed.

Personalisation and usability are characteristics that allow this tool to create a healthcare model user/patient-centred. Their needs and preferences are considered to allocate healthy habits promotion as a key issue for the user to start leading a more independent life. These features are improved by using specific functionalities of the Portlets.

An interactive and visual tool has been developed and integrated in an e-learning system in order to offer personalised information about healthy lifestyles. In this way, people should have better access to trusted sources of information, tailored to their individual requirements. The tool implemented goes further by adding a motivational feature with the aim of making users to be responsible of their health.

Future work should aim at multiplatform applications, with the specific target of mobile devices.

5. Acknowledgements

We would like to thank the PIPS Project (partially funded by EC, IST 507019), in which this tool is integrated. Besides, we would like to thank Mr. David Gil for his contribution to this paper.

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