IMPROHEALTH II - Web Based Virtual Quality Center for Vocational Education and Training in Health Informatics

Spyros Kitsiou, Maro Vlachopoulou, Manthou Vicky
University of Macedonia, Department of Applied Informatics, Thessaloniki Greece
skitsios@uom.gr, mavla@uom.gr, manthou@uom.gr

Abstract

IMPROHEALTH II is a European pilot project funded by the Leonardo Da Vinci action program, aiming to improve the quality, efficiency, and effectiveness of healthcare services through vocational education and training of healthcare professionals. One of the main goals of this project is the establishment of a web based Virtual Quality Center (VQC), which will allow healthcare professionals and students from health educational programs to obtain through an e-learning process the required knowledge, skills, and capabilities in the field of health informatics. This paper aims to present the IMPROHEALTH II pilot project and the main modules of the web based Virtual Quality Center (VCQ), discuss the main methods and materials of the new course in health informatics and its interactive web-based educational environment, and present its projected results and dissemination strategies.

1. Introduction

The healthcare sector is facing universally today many serious challenges with regard to the safe and effective delivery of complex and knowledge-intensive healthcare services to its citizens [1,2]. Health Informatics, the systematic application of information management and technology (IM&T) in health, is seen as a vital element and a powerful tool that offers tremendous opportunities in this drive for efficiency and effectiveness towards the planning and delivery of high quality and cost effective healthcare [3]. As a consequence, over the years, government bodies, healthcare policy makers, managers, and academics, worldwide, have tried increasingly through national strategy initiatives [4-6] and research projects [6-8] to implement integrated hospital information systems that successfully cover both administrative and clinical functions.

However, despite the strategic importance of all these initiatives, most of the efforts have been less than successful. Unfortunately, the international literature of health informatics is abound with stories reporting a high rate of implementation failures [9-11]. Evidence has shown that the main constraints and factors influencing negatively these implementations, often reside within the organization itself and the insufficient knowledge and skills of its healthcare professionals (e.g. physicians, nurses, managers, IT professionals, etc.) with respect to the fundamental capabilities and limitations of the technology, and the way in which such developments fit within their working environment. A number of surveys [12-15] as well as insights [16] have revealed that in many countries, and particularly in Europe [12], not only healthcare professionals lack knowledge in fundamental aspects of health informatics, but also students in health educational programs are not adequately trained for the challenges and opportunities they will face in the rapidly changing healthcare environment. In light of this situation, over the years a number of health professional organizations [17-20] have emphasized the need to include information technology and informatics concepts in formal healthcare educational programs. The International Medical
Informatics Association (IMIA) and its Group on Health and Medical Informatics Education drafted in 1999 broad guidelines for health informatics competencies and informatics education [21]. These guidelines delineated a range of learning outcomes for all healthcare professionals specializing in health and medical informatics. Fortunately, this action has led in the successful creation of formal training programs that provide custom tailored educational opportunities. However, as the demand for such individuals far outstrips the supply, both for academic and industrial career pathways, there is a growing consensus that the need for health informatics education, as well as continual life-long learning and development across healthcare professions, is still significantly high and of particular importance. Nevertheless, bearing in mind the volatile, complex, and demanding nature of the healthcare industry as well as the peculiarities of the healthcare academia, it would be unrealistic, on one hand to expect healthcare professionals to formally re-enter traditional educational programs in the field of health informatics, and on the other hand to expect the majority of health education programs to rapidly adjust their curricula and include a range of courses that cover differing aspects on health informatics. In addition, as the relationship between students and lecturers has considerably changed within the last decade due to the advances of ICT and web technology, many research studies and activities [22-24] have emphasized the importance and the effectiveness of web-based education in the field of health informatics. Within this context, an apparent need has been formed towards the establishment of virtual web based learning environments that can potentially accommodate and supplement the continuous learning and development requirements for both health students and healthcare professionals, in a flexible, simple, open and constructive method, in order to successfully facilitate electronically the desired vocational and educational training process in the field of health informatics.

Given this critical importance, in 2006 the IMPROHEALTH II pilot project, based on the successful outcomes of the preceding pilot project IMPROHEALTH I, both undertaken within the framework of the European community program Leonardo Da Vinci, has focused in the development of a new educational module on health informatics. This module will be available through an established and pilot tested web based platform, the Virtual Quality Center (VQC). This paper aims to present the IMPROHEALTH II pilot project and the main modules of its web based environment, discuss the main materials and methods of the new educational module in health informatics, and present its projected results and dissemination strategies.

2. Improhealth past, present, and future

The main aim of the IMPROHEALTH I research and piloting project [25], undertaken in 2003, was to contribute to the critical importance and needs of healthcare managerial and executive educational knowledge, skills, and personal abilities in the area of modern management, by widening the existing potentiality that web based Vocational and Education Training (VET) may offer in the healthcare sector toward improvements in the quality and effectiveness of healthcare organizational services.

After two years of research and development work, which took place among a well experienced consortium from 6 different countries (Greece, Slovakia, Czech Republic, Finland and Sweden), comprised by university academics and healthcare professional researchers with educational expertise in the area of healthcare management and informatics, the aim of the project was successfully sustained through the establishment and pilot run of the Virtual Quality Center (VQC). A web based e-learning platform, which offered to 250
healthcare managers and professionals, from the 6 participating nations in their corresponding language, a range of educational courses, manuals and tools in electronic form (e.g. e-Text books, power point slides, glossaries, CD-ROMs, etc) supporting, therefore, a flexible and interactive learning environment suitable for self-directed study in terms of pace, place and time. An overview of the IMPROHEALTH results is available in [26]. When the project completed, an evaluation survey of the participants, undertaken by the consortium, revealed a huge response and interest in additional healthcare topics such as, health informatics, consumer and public health informatics, strategic management of healthcare organizations, and healthcare economy. Moreover, based on the qualitative and quantitative research results, as well as through personal discussions with the participants in the form of emails and phone conversations, additional needs were also identified regarding the adoption of more effective educational methods (e.g. Problem Based Learning (PBL) tools, best practices, and case studies) and improvements in the VQC.

Therefore, through the formation and acceptance of a new proposal in 2006, and the addition of 4 more partners from Germany, Italy, Spain, and Romania, the IMPROHEALTH II collaborative project emerged. The aim of this project is to focus on the development of new integrative and innovative educational methods to remedy the observed lack of information and knowledge of healthcare professionals in the specific areas of health informatics and management, through web based vocational education and training, while drawing from the outcomes and the learning experiences that were gained in IMPROHEALTH I. The outcomes of this initiative are expected to bring an added value both to the project and its participants, since healthcare professionals will be provided with an excellent opportunity to gain significant knowledge and skills in important aspects of health informatics and also to learn how to work in a virtual web based learning environment.

3. Materials and methods for the health informatics course

In an effort to construct a dynamic strategy that will successfully meet the objectives of the IMPROHEALTH II, particularly with respect to the health informatics course, during the initial state of the project several steps and prospected actions were delineated (Figure 1). The first actions involve a needs analysis for the effective development of the new e-Learning course, e-Tools, and eGlossaries, based on Health Professional Organization guidelines and identification of educational needs via questionnaire surveys on targeted groups. In addition, subsequent steps and actions involve the continuous enhancement and improvement of the VQC platform to conform to a set of rules and best practices that govern the foundation of open and distance learning.

As it was mentioned earlier, the International Medical Informatics Association (IMIA) endorsed a set of recommendations on education in health and medical informatics in 1999 and a content scientific map was also developed in 2002 [21]. Moreover, recent research actions have analyzed the various roles and functions of health informaticians and have developed associated competencies for healthcare professionals and students [17-20]. These recommendations provide a sound foundation for a comprehensive and detailed health informatics course framework and therefore, will be used in the project as a basis for the development of the educational material of the e-learning course. However, as these recommendations have recognized that both healthcare professionals and students of health educational programs possess a diverse background in terms of scientific knowledge areas and professional experience, it can be argued that this diversity makes it difficult to model appropriately a health informatics education framework [15].
In light of this premise, the aforementioned works have provided a sound foundation for the development of the IMPROHEALTH II survey, the results of which will further advance and custom-tailor a comprehensive health informatics course framework. Although, the final outcomes and analysis of this research are not yet fully available, a few critical findings that emerged have served as an input to the health informatics course aim and content.

3.1. Educational aims and content

The principal aim of the course is to teach healthcare professionals and students the fundamental theoretical and practical concepts of health informatics – the systematic application of information technology and management methods in the processing of data, information, and knowledge to support decision making and evidence based practice in medicine and healthcare. Moreover, the course aims to provide insights and answers through the availability of an electronic text book, glossary, hypertext links, references, power point presentations, case studies and problem based learning methods, in the following main questions:

- Why is information management and ICT a central issue in clinical practice and research?
- What are the primary information requirements of healthcare organizations?
- What are the clinical, financial, and administrative functions provided by a healthcare information system and what are the potential benefits of integrating such systems?
- What are the visions and challenges of the health informatics field?

Drawing from the IMIA recommendations, as well as on the consortium’s professional and educational experiences, the main content outline of the health informatics course is illustrated in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Health informatics course content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
</tr>
<tr>
<td>Information Technologies and Methods</td>
</tr>
</tbody>
</table>
for the Processing and Management of      |                                                                             |
3.2. Learning Environment

According to the literature, the web-based learning environments affects the learning outcome differently based also on the pedagogy adopted (traditional instruction versus constructive), the design of the course website (linear versus hypertext), and the interaction possibilities provided by the learning platforms (interaction only with the learning material versus interactions with peers and instructor). According to Romanov and Nevgi [24], the establishment of a virtual interactive environment that facilitates collaborative learning methods by using the facilities of computer-mediated communication (CMC) can be regarded as a promise for better learning outcomes. Consequently, when the IMPROHEALTH I project emerged, the consortium had to choose between two different designs for the Virtual Quality Center: (1) a conventional web based platform for individual learning without student and teacher collaboration tools, and (2) course material in a virtually designed learning environment with special learning and communication tools.

Although, the second approach was adopted and implemented, based on the survey results of the participants from the pilot run of the IMPROHEALTH I, it became clear to the project team that regardless of the high acceptance rate with respect to the VQC platform, additional improvements toward the development of unique online communication and multimedia tools were important to further enhance the learning process of healthcare professionals. Therefore, a list of requirements, good practices and techniques to capitalize on the unique capabilities of the web were developed. A summary of these is illustrated in Table 2.

| Table 2. List of requirements and good e-learning practices for the VQC |

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Requirements</th>
<th>Good Practices and Techniques</th>
</tr>
</thead>
</table>
| Virtual Environment Quality and Functionality | • Simple and easy to remember domain name for the VQC  
• Friendly and informative environment  
• Clear, concise, and consistent presentation of information  
• Easy navigation to the various educational materials and products (e-course modules, e-manuals, and e-tools) offered in the VQC  
• Help functions availability | • Domain name ([www.improhealth.org](http://www.improhealth.org))  
• Display of ‘welcome’ announcement in the VQC and information, and mission of the project  
• Concise text that facilitates “scanning”, clear headings, hierarchy of importance, short phrases, and bulleted outlines  
• Clear links to sections and categories, unambiguous hyperlink labels, utilities (help functions, instructions, contact info), flat size architecture to minimize “clicks” |
<table>
<thead>
<tr>
<th>Quality of Information before the course commences</th>
<th>Quality of Information during the course</th>
<th>Evaluation and assessment tasks to be carried out as the modules progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Syllabus and Timetables</td>
<td>Availability of teacher’s contacting information</td>
<td>Methods for assessing accessibility</td>
</tr>
<tr>
<td>Registration processes</td>
<td>Educational References</td>
<td>Methods for student assessment</td>
</tr>
<tr>
<td>Instructor’s access to the platform for courseware uploads</td>
<td>Interactive learning by experience</td>
<td>Evaluation of course and e-learning environment satisfaction</td>
</tr>
<tr>
<td></td>
<td>“Off-line” availability of educational material</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interactive communication methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teacher profile creation with resume and contact information (email, skype name, and phone numbers)</td>
<td>Monitoring of course statistics provided by the VQC platform</td>
</tr>
<tr>
<td></td>
<td>Development of electronic registration forms and secure login techniques</td>
<td>Assessment of student course work through e-questionnaires and e-tests</td>
</tr>
<tr>
<td></td>
<td>Log-in mechanisms to upload lecture notes, presentations, references and other educational material</td>
<td>Evaluation survey at the end of the course</td>
</tr>
</tbody>
</table>

4. Dissemination of project outcomes

Consequently, for the wider presentation of the project’s products and results among healthcare professionals and students, each partner of the IMPROHEALTH has undertaken a number of tasks and responsibilities to organize a series of actions as part of the formulated project dissemination strategy. The focus of the dissemination strategy has four levels of attention: local, regional, national, and international. These levels have been, and continue to be, met through the following activities:

- Project Informational web site
- Brochures and leaflets for healthcare professionals and healthcare students
- Project information days aiming to inform healthcare professionals about the IMPROHEALTH I and II pilot project
- Publication of research papers, and
- Participation in international conferences
- Pilot running and seminars of the Virtual Training for the managers and executives of healthcare organizations as well as other potential users who are involved in decision-making of healthcare organizations and may found the use of the IMPROHEALTH educational resources beneficiary based on the particular needs of their professional career.
5. Conclusions

Healthcare professionals and students have shown large gaps in their knowledge with respect to health informatics. Healthcare professional organizations as well as healthcare leaders have increasingly emphasized the need to include information technology and informatics concepts in formal education programs, yet integration has progressed slowly. Over the years, the European Union has funded many telematics projects in healthcare. However, the results of these projects have not yet being successfully applied on a large scale, since healthcare professionals are not able to grasp the potential contribution and limitation of these developments within their working environment. Moreover, as the demand for individuals with a comprehensive knowledge in the application of ICT in the healthcare domain far outstrips the supply, both for academic and industrial career pathways, there is a growing consensus that the need for health informatics education, as well as continual life-long learning and development across healthcare professions, is still significantly high and of particular importance. This paper has presented the IMPROHEALTH II programme aiming to remedy this knowledge gap by delivering a range of suitable courseware for vocational education and training in health informatics via a web based virtual environment. The main objectives, methods and processes toward this direction were presented in a simple yet comprehensive manner. Taking into consideration the opportunities of e-learning, a number of key elements that condition the successful establishment of an interactive online learning environment were also discussed. In addition, with the establishment of the VQC and the professional expertise of the project’s consortium, the IMPROHEALTH programme aims not to substitute any formal educational programs in this field, but to further assist healthcare professionals and students in gaining the appropriate skills and competencies in the critical field of health informatics, in order to be able to cope with the increasing challenges of the healthcare industry.

6. References

[25] IMPROHEALTH pilot project (SK/03/B/F/PP-177014) Leonardo Da Vinci, Available at: http://www.improhealth.org