

E-learning for Professional Education of Personnel in a Hospital

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Abstract—A collaboration among the Hospital S. Giovanni Battista of Turin, the Politecnico of Turin, and the MUST company is described. The content of the collaboration has been and is the use of ICT's, e-learning, and blended learning for the internal professional education, training, and keeping up to date of the personnel of the hospital. A platform for the delivery of the teaching materials has been built, including an evaluation and self-evaluation tool. The first on line courses have been developed and delivered and many more are in preparation. The first results of the monitoring of the efficacy of the online education have been positive.

Keywords—E-learning, blended learning, on line education, ICT.

I. INTRODUCTION

STARTING in 2003 a collaboration has been established between a public hospital in the city of Turin in Italy (the S. Giovanni Battista), a public university (the Politecnico of Turin), and a private software house (MUST, i.e. Multimedia Services and Training). The primary motivation for this collaboration comes from the need for the hospital of efficiently guaranteeing a continuous formation and vocational training for its personnel, medical, paramedical, and staff as well. In Italy a number of professional profiles in the health sector must, by law, acquire an assigned number of formation credits in ECM (Continuous Education in Medicine) each year. The credits assigned to each specific course are defined by the Italian Ministry of Health depending on the content and duration of the educational activity.

The S. Giovanni Hospital (also known as "Le Molinette") is the biggest in the Piedmont region (the third in Italy). It is located in the city of Turin and has 5,500 employees; 3,200 of them are bound to the obligation of acquiring the prescribed ECM credits. The numbers immediately posit a delicate problem concerning the most efficient way to organize and manage the corresponding formation and training activities. The traditional approach with face to face lecturing, still widely used,

implies huge efforts and a great complexity for the purely logistical management. The size of the problem can be seen considering that in one semester more than 2000 hours of direct lecturing are delivered for 3,300 people.

The Politecnico of Turin is a technical university with an entire faculty and many research and development activities devoted to the applications of ICT's and software design. The entity participating in the project is the e-learning group of the Department of Physics (DIFIS). The group has cumulated a considerable experience in e-learning techniques and learning objects production, developing various projects both at the local and the international level. Specifically relevant are the TOL project, conducted together with MUST, that led to the building of a specialized software and platform for evaluation and self-evaluation [1], [2]; the FIL project for building a web based platform for the delivery of educational contents in physics [3]; the international EVALU project, within the European ALFA programme, aimed at constituting an inter-university network between Europe and Latin America based on a common evaluation standard [4].

Finally the third member of the collaboration, MUST, is a private software house born and grown in the incubator for innovative enterprises of the Politecnico and now completely independent. MUST works together with the group at the DIFIS since its very foundation and is specialized in educational software.

The nature of the problem to be tackled and the convergence of the activities and interests of the partners have triggered an agreement, whose final product has been a delivery platform specialized for medical or in general sanitary education now in use and in continuous growth at the "Molinette".

II. INITIAL CONDITIONS

Once the decision of resorting to ICT techniques for the internal crediting in ECM was taken and the first contacts established for the implementation of the project, a number of practical difficulties had to be surmounted.

These difficulties had to do with the endowment of electronic and computing devices in the hospital. Furthermore the initially existing machines were not equipped with software appropriate for receiving and treating multimedia objects for education; people were not used to employ such kind of software and had limited training for this type of application. Of course the solution of these limits had a cost that the hospital administration had to cover.

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Luckily however the e-learning project has come at the very moment when also a general programme of renewal, updating and extension of both the hardware and software of Le Molinette had also been started. As a result of this process the hospital has been endowed with 2,300 PC, a complete intranet network has been built, most machines have been connected to the internet. A personal e-mail address has been assigned to all employees and a generalized basic training in essential software has been given to everybody. A dedicated and properly equipped classroom has been assembled and the basic software platform, adapted from an existing one of the DIFIS, has been acquired, thus opening the site *Formazione Molinette*. The entrance page is shown on Fig. 1.



Fig. 1 Access page of the Formazione Molinette site

The site is accessible both from the internet and from the intranet of the Molinette, but for security reasons it is hosted on a server placed outside the hospital. The initial platform, denominated “MUST 4 learning” was an instructor centered one, modular and flexible, customizable according to specific needs.

III. THE “SERVICE”

Once the material bases had been laid, a joint working group was formed with the objective of elaborating the software dedicated to the management of competencies and educational needs. This application software, known as “Service” must fulfill a number of different tasks, ranging from an efficient use of the classrooms, to the online booking of users for the available courses, both face to face and on the web, to the tracking of the formation history of all users. In general, “Service” must allow the managers of the various sections of the hospital to evaluate the real needs of training and continuous education of all their employees, and to effectively monitor the results. Each single user, on his/her turn may have access to a data set witnessing her/his progress in the education process. As far as the platform is enriched with new contents the system offers a growing stock of formation opportunities with better quality and individually tailored strategies.

IV. THE CONTENTS

The learning materials are developed through the work of a number of interdisciplinary groups complemented by software and instructional design experts. The professional contents are expressed by experts internal to the hospital, acting as direct or virtual teachers, while the other competencies come from the external partners.

In each team the instructional designer, working together with the appointed teachers, leads the group to the definition of the story board of the given educational module. MUST is then taking care of the graphic and multimedia aspects, and to ease the direct work by teachers, has designed an author-tool named *mustcoursemaker*. This tool is a user friendly software allowing non-specialists to create their web pages, including images and text.

The solution of the initial concrete problems, the start up of the managing system, the definition of the work methodology has in practice taken the first couple of years of the project. Then finally the first complete courses have begun to be produced and tested.

The very first online course has been “Chemical risk: working with dangerous chemical agents in safe conditions”. The course has been tested on a group of volunteers and has been analyzed in order to identify the criticalities and difficulties encountered by the users accessing it from their working places.



Fig. 2 A typical page of the course “Chemical risk: working with dangerous chemical agents in safe conditions”

The analysis made by a student of the University School for nurses as part of her thesis work [5], has been based on the definition of concept maps before and after attending the online course. In practice the researcher has performed interviews concerning the content of the course both with the students and the teachers who had defined and developed the e-learning materials. The students were a volunteering group of 16 people coming from different divisions and services of the hospital; they were interviewed before and after attending the course. The scope of the interview was to build a conceptual

map of the knowledge of the interviewed person on the subject. Conceptual map means the group of specific notions and of their interrelations and implications. An example for a student, drawn before the course may be seen in Fig. 3.

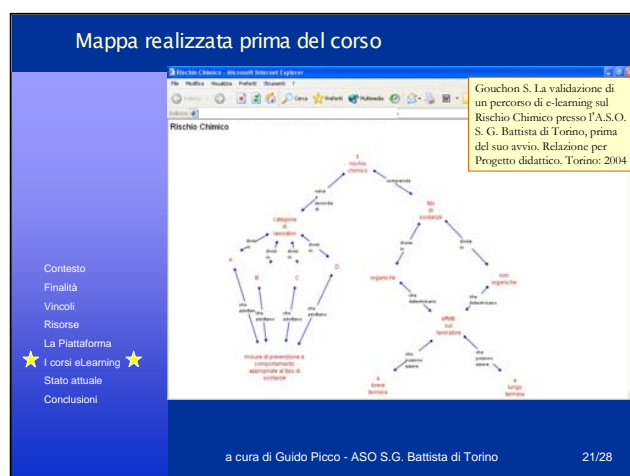


Fig. 3 Conceptual map of a student taken before the course on "Chemical Risk"



Fig. 4 The same as in Fig. 3 but taken after the course

The idea is that after the course the map should be different than before and similar to the one describing the knowledge of the teachers. The map after the course was indeed different than before, as can be seen in Fig. 4.

The comparison with the teachers' maps was made considering various aspects. Furthermore the students had to pass a typical end-of-course test besides answering to the interview and to a questionnaire on their satisfaction or dissatisfaction with the course.

It is remarkable that, even though the results of the conventional test were generally quite good, the amelioration of the conceptual maps was not equally good. This feature is indeed instructive with respect to the confidence level to be attributed to traditional tests. The results of the traditional test may be

seen in Fig. 5, whereas Fig. 6 shows the evolution of contents measured by means of conceptual maps. The result is manifestly less positive than the one in Fig. 5. Of course an evaluation by means of conceptual maps is much more complex than the one by means of a plain test and is in practice unfeasible when the number of students is big.

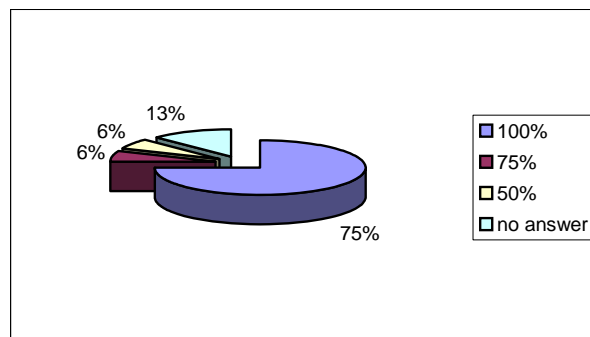


Fig. 5 Results of the traditional test after the course on "Chemical risk". The percentages corresponding to different colors are with respect to the number of correct answers given by the candidates

Despite this difference the general rating given to this initial course has been positive and encouraging. The evaluations given by the students in the questionnaire have also been generally positive.

Moving from the first positive experiment a second more delicate objective has been pursued: a course on radioprotection, for medical personnel working in the radiology service. Considering the rapid evolution of the techniques of radio-diagnosis, in this field it is especially important to keep people up to date and the web has proven to be a good vehicle for the education. The course consists of 12 modules and the user, in order to pass from one module to the following one, must pass an intermediate test, and, to obtain the ECM credits, must pass a final test. Fig. 7 shows a page of the Radioprotection course.

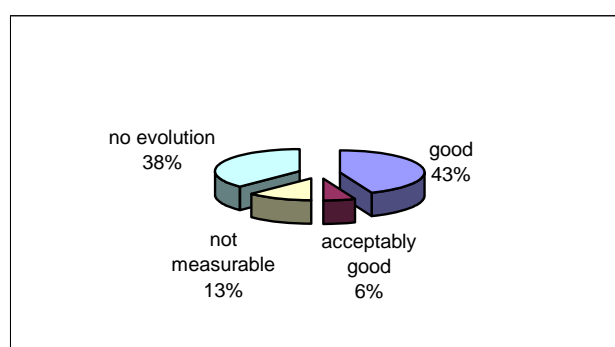


Fig. 6 Modification of the contents pertinent to the Chemical Risk course measured by means of a conceptual map



Fig. 7 A page of the course on Radioprotection

V. THE PRESENT STATE OF THE PROJECT

After the two online courses which have been mentioned before, others are under way concerning: advanced use of word-processors and electronic sheets, risk management problems, prevention of risk for pregnant workers, safety in work environments. Besides actual courses that lead to the assignment of credits the platform has been used also to deliver questionnaires about hospital infections and to test the "customer" satisfaction of the employees.

Altogether the e-learning platform has been used by 4800 users. The datum refers to spring 2006. The distribution of the users is shown in Table I.

TABLE I
NUMBER OF USERS FOR THE VARIOUS COURSES AND QUESTIONNAIRES DISTRIBUTED BY MEANS OF THE PLATFORM DESCRIBED IN THE TEXT

Activity	Users
Chemical Risk course	169
Radioprotection course	140
Hospital infections questionnaire	2176
Customer satisfaction questionnaire	2337

VI. CONCLUSION AND PERSPECTIVES

The project that has been synthetically described here is under way. Its main feature is not in introducing brand new tools for e-learning, but rather in applying and adapting existing methodologies to a full scale case, which is a big hospital with all its needs, structure, inertia, rigidity. The beginning has been slow, but now the extension of the experience is speeding up. New courses are in preparation. Learning materials are being developed in modules usable as building blocks for different purposes. Everything is being converted (or prepared, if new) in such a way to be compliant with the AICC (Aviation Industry Computer based training Committee: an international organization treating standardization in computer based learning systems) and SCORM (Sharable Content Object Reference Model) standards.

An element of particular satisfaction we wish to stress is the good degree of collaboration attained among very different people, coming from university, private enterprise, medical experts, administration staff. The idea is now to stabilize the collaboration creating a dedicated consortium, which will be able to extend its activity attracting new partners both on the academic side and on the health compartment institutions.

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