Informatization of the evaluation system of clinical and communitary internships in the context of Health Sciences Degrees

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Abstract: - Information and communication technologies are evolving in an unprecedented way that is affecting daily life in all its aspects. Nowadays, one can consult an academic file, book a restaurant, request a medical appointment, or access the largest libraries and databases in the world by a single click of the computer mouse. These advances can also be applied to the field of tele-education and the informatization of teaching processes. The present work relates the process of automatizing the evaluation system of student practices in various socio-assistential centers in the context of a Degree in Occupational Therapy. The innovating character of this application allows students, tutors, and coordinators to access internship information in real time: they can consult timetables, the beginning and end of practices, changes in organization, tutors that are responsible at all times, the assignation of centers, and an online evaluation of the previous. Thanks to the informatization of the entire process, evaluating centers, students, averages, comments, and suggestions is no longer a time-consuming and elaborate manual undertaking

Key-Words: - Tele-education, Internet applications, PHP, HTML, Web Systems, Teaching Staff Evaluation, MySQL, Education technology

1 Introduction

When the so-called "New Technologies" came to the foreground during the last decades of the twentieth century, they initiated what would become known as the "Digital Revolution". Whereas previous revolutions were a reasonably gradual process, the digital revolution has been extremely fast in integrating into society a whole range of changes and transformations that derive from the development of information and communication technologies (ICT).

The "Information Society" (IS) was born and would soon evolve into today's "Knowledge Society", in which enormous amounts of information can be accessed and individuals from other space and time zones can be reached effortlessly. In a positive approach to the potential of the Internet and other applications as tools for a change in educational praxis, this work wishes to help understand that the incorporation of technologies in the field of education depends on a great many factors, but mainly on the training and attitude of teachers and the willingness of the educational community to offer a more flexible and integrating education that is connected to the outside world as well as focused on each individual student. We also share the conviction that integrating TIC in this particular field is a difficult task that requires a progressive attitude towards the numerous changes that will inevitably take place.

2 Problem Formulation

Among the requirements towards obtaining a Degree in Occupational Therapy at the University of A Coruna is the successful completion of the subjects "Internships I" in the second year and "Internships II" in the third year. These subjects give students the opportunity to carry out practical work in various socio-assistential centers. The organization and evaluation of these students is the responsibility of a

coordinating professor and constitutes a complex process in various stages.

Table I. Center valuation form

Center valuation	1	2	3	4	5
1.-Reception and coordination upon arrival					
2.-Description and tour of center					
3.-Adequate space and equipment					
4.-Supervision					
5.-Learning acquired in the course					
6.-Adequate time foreseen for internship					
7.-Valoration of applied techniques					
8.-Valoration of internship tutor(s)					
9.-Center is adequate for the activity					
10.-Personal valoration of the internships					

2.1 The practical training of Occupational Therapy students

The first stage consists in defining each year the socio-assistential centers that will host students. Each centre must define the number of students that it can host without affecting its daily activity, which usually means 1 to 3 students, and determine how long each student is allowed to stay. One of these centers is a laboratory that must be attended by all the students and usually hosts groups of 12 to 18 persons. The students are then divided into teams of 2 to 4 members and the duration of their rotating internships is defined in terms of weeks. A normal shift consists in 24 weeks, excluding personal and academic vacations such as Christmas, Easter, etc. The student groups are assigned to the centers

Table II. Student valuation form

Concept	1	2	3	4	5
1.-Punctuality					
2.-Attitude towards norms and rules					
3.-Interest					
4.-Initiative					
5.-Responsibility					
6.-Relation with user					
7.-Relation with other staff					
8.-Evolution					
9.-Integration of knowledge					
10.- Acquired dexterity					

2.2 The reciprocate evaluation process

When a student has completed an internship, he/she must fill out a valuation survey (from 1 to 5) for the center that hosted the practice. An example can be seen in Table I.

The tutor who supervised the internship must also evaluate the student by ranging from 1 to 5 a series of parameters that are shown in Table II. Each center defines a tutor who is responsible for the student team and in charge of establishing the individual valuation of each student's work.

Based on all the evaluations of a student, the subject coordinator calculates the average grade for that subject. In a similar way, the coordinator has access to the evaluations made by the students for each center, and he uses that information to decide which center continues in the subject programmer.

3 Specifications of the application

The application must provide the following services: maintain a database of students that are registered in the system and of the groups they belong to; show and modify the internship centers that are stored in the system; register the periods during which the internships must be carried out and the available centers; allow both students and tutors in charge of the internships to fill out surveys; and generate automatically the follow-up reports of each student. These reports can be informative, e.g. the list of students that do not rotate in a particular center, or final, e.g. the students' average grades.

Users of the system

The application presents three types of users that can access the system through a username and password: students, internship tutors, and subject coordinators.

- **Student**: The student must be able to visualize the practices he/she will have to attend with their timetables and coordinating tutors. When a practice is over, the student must be able to fill out the valoration form and possibly correct a previously given valoration.
- **Internship tutor**: The tutor must be able to access the data of the students that will participate in an internship, evaluate them, and if necessary correct previously given assessments.
- **Subject coordinator**: The coordinator must have access to all the information concerning the subject. He/she is in charge of registering the students and the practices, establishing the shifts, and modifying them if necessary.

The subject coordinator must also be able to access the generation of the following reports:

- Report of students who do not participate in certain practices.
- Report of students who do a certain practice in a certain week.
- Report of students with pending evaluations: a list of all the students who have done a practice but have not yet evaluated it.

- Report of students with their average grade: a list of all the students and the average grade obtained for each center. This report shall be used to access the detailed grades of each student for each practice.
- Report of tutors with pending evaluations: a list of all the tutors who have terminated a practice with a student but still have to evaluate him/her.
- Report of practices with evaluations

4 Equipment

Web server: Apache. This server was developed from 1995 onwards by the Apache Project to be exectued in Unix operative systems. At present there are Apache distributions for Unix, Linux, NetWare, and Windows, which makes it the most popular web applications server in the world. Statistics by Netcraft [1] have established that approximately 60% of the active websites are supported by Apache [2].

Programming language: PHP. The development of this project requires a language that provides access to data stored in the server and that generates the pages that will be sent to the client. PHP responds perfectly to these requirements: it is a script language (instead of being compiled into a machine code, an interpreter reads the code and executes its instructions) that mixes with the HTML code to generate pages whose content is generally based on information that was recuperated from databases [3][4].

Database manager: MySQL. We opted for a relational database management system. MySQL is relational and provides rapid and efficient storage, search and recuperation of data, as well as a data access control that guarantees the possibility of simultaneous users. Also, its integration with Apache and PHP makes these three components the most widely used tools in web applications development [3-8].

Tool for the generation of PHP reports: FPDF. This tool is a class written in PHP that allows the generation of documents in pdf format. In order to generate these documents, the class implements a series of functions that allow us to compose pdf document step by step from the PHP language [9].

5 Development methodology

The development of this project has a cascaded life cycle, which means that it always finishes a complete phase before starting the next one, except in the test phase, which partially takes place during codification. The application as such has a life cycle with four phases: specification of requirements, analysis, design, and tests [10].

- **Specification of requirements**: This phase specifies all the requirements that must be met by the programme by consulting the conditions with the person who requests the application.
- **Analysis**: In this phase, the requirements are represented graphically, after which the development process can start.
- **Design**: This phase starts with the result of the analysis phase to study in depth the detail level and reach the codification process.
- **Codification**: The code of the programme is written on the basis of the result of the design process.
- **Tests**: Since a test is carried out for each written module, this phase is included in the codification phase. Once the entire code is written, the system can be tested.

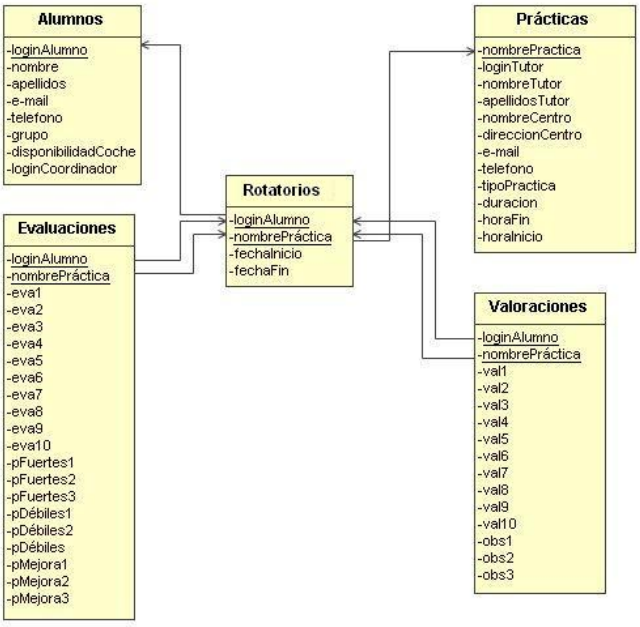

Fig. 1. Relational Model of the database

5.1 Architectural Pattern Model-View-Controller (MVC)

The application follows an architecture that is based on the architectural MVC pattern (Model-View-Controller) which classifies objects into three different types. The model consists of the objects of the application domain field, the view consists of the classes that represent the data required by the user, and the controller consists of the classes in charge of coordinating the previous two. In this way, and upon the request of a user, the coordinating class selects the data required from the model and provides the

class of the interface that is adequate to represent them [11][12].

In this application, we have implemented a class that belongs to the controller layer for each of the functions needed to complement a use case. For instance, for the use case "generate a report of students who do not rotate in particular centers" we will have to show the names of the internship centers so that the user can select those centers that he wishes to mention in his report. After this selection, the application must obtain the data of the students who do not rotate in the selected centers. So in order to carry out this use case, the programme will have to perform two functions: select internship centers, and obtain the data of the students who do not do practices in them. This means that there will be two classes that belong to the controller layer that corresponds to these two functions.

Fig. 2. Initial access screen

The model layer consists of the classes of the view domain, in charge of accessing the stored data, and the classes that provide an interface to access the previous classes.

The view layer consists of the classes that execute functions for the printing of data on the screen. Since this is a web application, the view classes will be those that contain HTNL labels, i.e. references to files with style sheets and/or functions proper to the language to print the data on screen.

Fig. 3. Student profile. Consultation of practices calendar and valorations

6 Results and discussion

In this application, the data with a persistent character are stored in a relational database [7]. Fig. 1 shows the relational model: the primary keys are underlined and the foreign keys are linked to the corresponding primary keys with an arrow. We have defined five tables for the following categories: students, practices, rotations, evaluations, and valorations.

The primary key of the students table is the name of the user (login), whereas the primary key of the practices table is the name of the practice. A table that is generated from an association class has a foreign key that refers to each of the tables that constitute that association. All the foreign keys of this table constitute the primary key of this table. The evaluation and valoration classes maintain a unidirectional relationship with the rotation class, which implies that the evaluation and valoration tables have a foreign key that refers to the rotations table.

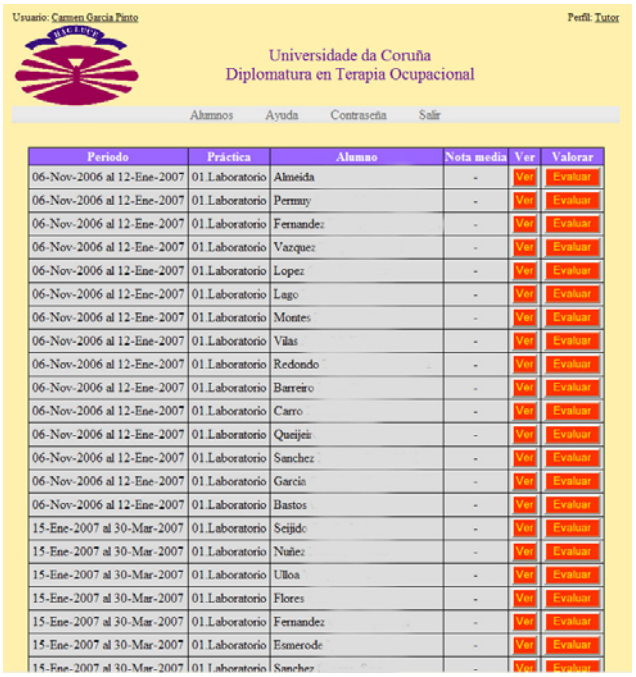

Fig. 4. Tutor Profile. The tutor can consult and evaluate the students

6.1 The application

The application is currently active. In the course of the academic year 2006-2007 a parallel evaluation is taking place comparing the traditional system and the computerized application. Students and tutors use the web pages, print the report, and deliver it in person in order to investigate any possible mistakes that may occur during the activation of the system. Up to the

present date, 80% of the students and 90% of the centers have been evaluated without any marked obstacles.

Fig. 2 shows the initial access screen. The user must enter his/her username and password in order to be given access to the system.

Once the user us authenticated, the application shows the environment of the user profile:

If the user is a student, he/she can consult the practices calendar and assess the centers that have already been visited, as shown in Fig. 3.

If the user is a tutor, he/she can access the list of assigned students and evaluate those students that have already rotated under supervision. Fig. 4 shows the interface of the tutor profile. In the right column the tutor can access the valoration form (Fig. 5) for consultation or data storage.

Fig. 5. Student evaluation form

If the user is a coordinator, he/she can access the majority of the system's functions: student management, internship centers, assignation of groups to centers, establishment of internship calendars (Fig. 6), and consultation of reports.

7 Conclusion

Information and communication technologies are not only useful to professors and students, they can also simplify to a great extent the management and administrative tasks of the centers they attend.

The University of La Coruña has developed a computerized application that improves the existing system with the following advantages and functionalities:

- More speed and simplicity in the process
- Updated information
- Availability of the information in real time
- Fill out surveys related to the center
- Final automatized valuation
- No loss of information
- Generation of a database with all the students who have done clinical practices
- Generation of reports
- Internet allows the interconnection between various educational centers
- Interactivity

The important advances in the field of computer science and the advantages they entail lead to an increasing implementation of this type of tool in the management systems of educational centers.

On the one hand, creating these resources is complicated, because they have to offer an added value, such as the possibility to interact or present simulations, virtual reality, or even adaptations of the equipment to national, regional and even local characteristics.

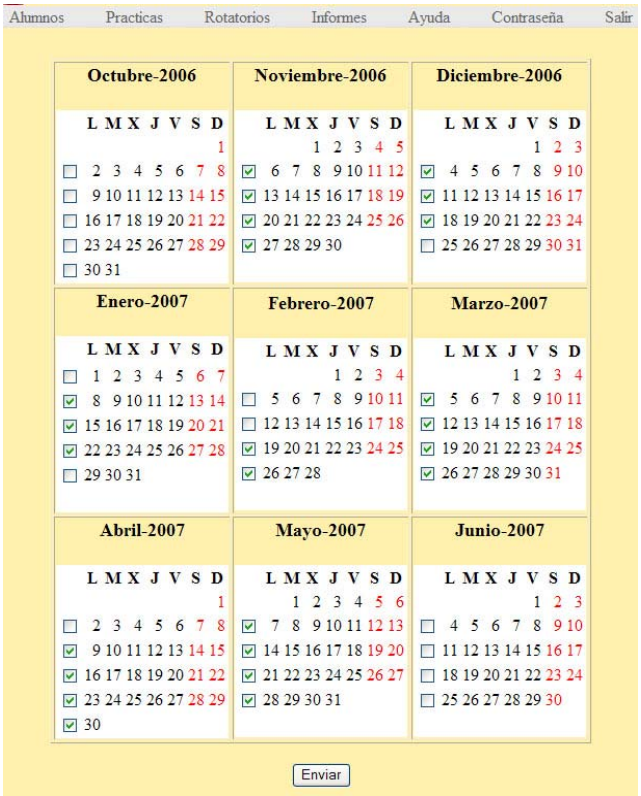

Fig. 6. Coordinator profile. Example of the definition of an internships calendar

On the other hand, the new contents are more adaptable and are more easily modified. Teachers now have the opportunity to generate educational

contents that agree with the interests or particularities of students and their educational context. These computerized resources have a moderate cost and can therefore be created for small student groups and even for individual students. This easiness in creating educational material has already given rise to e-learning measures and increased online contents in a number of countries.

The goodwill of the universities and the specific training of the teaching staff are two indispensable factors in the implementation of ICT into the teaching-learning process, even if most equipments and infrastructures are still in need of improvement.

The Information Society that is being created implies that universities should use and exploit to the fullest the increasing potential of new technologies and hereby avoid a situation of exclusion.

8 Acknowledgements

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