EXPERIENCIAS E INNOVACIÓN DOCENTE EN EL CONTEXTO ACTUAL DE LA DOCENCIA UNIVERSITARIA

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Experiencias e innovación docente en el contexto actual de la docencia universitaria

Experiencias e innovación docente no contexto actual da docencia universitaria

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Integrated Management of Higher Education Institutions

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Abstract

Higher education institutions have adopted education, research and cooperation as their main missions. Students, teachers and non-teaching staff articulate for lecturing, researching and developing projects and internships, according to the institution goals and strategy. Quality evaluation is of the utmost importance in the whole process, as it allows providing a competent and rigorous service as well as maintaining high level of attractiveness for additional funding, through cooperation and research projects. In this process, well supported management through rigorous information is necessary, providing a sound basis for reasoning and improvement.

In this paper we present a custom made application, which we call JagPAD, to integrate, process and visualize information from several departments and sections, such as student records, human resources, scientific repository and others. This application is in use at the Polytechnic Institute of Bragança and constitutes a valuable tool for overall evaluation of the mission compliance.

Keywords

Higher Education, Human Resources Management, Academic Information.

1. Introduction

Higher education institutions (HEI) have three primary missions: education, research and cooperation (Kyvik & Lepori, 2010). While in different weights and strategic importance, most institutions try to cope with these missions to contribute for population education at high level, scientific and technological advances and economic and social development.

Education regulations in Portugal, in particular the Basic Law for the Education System, was changed recently in order to implement the Bologna Process (Law 49/2005 of 30 of August and Law 74/2006 of 24th of March). The new

structure was divided into 3 cycles of studies and was completely implemented in 2009/2010 (Neave & Amaral, 2012). The 1st cycle, known as *Licenciado* Degree, has 180 credits and a normal length of six curricular semesters of students' work (level 6 of the EQF). The 2nd cycle, known as *Mestre* Degree, has from 90 to 120 credits and a normal length of between three to four curricular semesters of students' work (level 7 of the EQF). The 3rd cycle, *Doutor* Degree, is only conferred by university institutions and is conferred to those that, after concluding all the curricular units that integrate the study course of the *Doutoramento* (doctorate) course have successfully defended their thesis in the public act (level 8 of the EQF). In addition to the higher education three cycles, another, post-secondary, training is currently available. This training course is specially tailored to provide a high-level technical competences in a short time (EQF, level 5).

The research mission has always been embraced by higher education institutions in a way that governments, as well as private institutions, have begun to recognize the research role of these institutions, to provide them with research funding and to initiate various measures for enhancing research activities. Research remains the primary path not only to individual and institutional prestige but also to support teaching excellence. Finally, the cooperation mission includes international, regional, social, culture and science promotion and cooperation with enterprises. In broad terms, cooperation aim to bring together higher education institutions and enterprises in order to promote entrepreneurship, creative thinking and innovative approaches as part of the curriculum for students and as a skill for teachers/researchers and to reinforce the link between studies and employment needs.

To ensure quality in higher education institutions, several legal diplomas were defined. Law 38/2007 of 16 of August, describes the evaluation of HEI quality, through the assessment of the degree of compliance of their mission through parameters related to their performance and the results arising therefrom. Some parameters for evaluation include, for example, the provided teaching scientific levels, learning methodology and student evaluation processes, teachers qualification and adequacy and the produced scientific, technological and artistic activity. Moreover, it is also considered the adopted quality improvement strategy and how it is enforced, international cooperation, efficiency and organization of the management body, infrastructures and pedagogical and scientific equipment, among others (Allison & Kaye, 2003). The consequences of quality assessment are reflected in the accreditation of courses and institutions. This responsibility is of the National Agency for Evaluation and Accreditation of Higher Education (A3ES). The A3ES is independent of the government and has the role to perform a quality evaluation of all HEI and provided courses.

From the higher education institutions perspective, quality enforcement demands the involvement of all the actors: the management body, teachers, students, non-teaching staff and external community, around a quality strategy. Management body has the tools and resources to apply to quality management,

considering that information is central to this process (Mishra, 2007). It is initially collected, processed and analyzed and then used to extract knowledge, that ultimately influence mechanisms through reasoning. Information is collected and organized according to the institution mission relating, in particular, to academic information, scientific, technical and artistic and cooperation (Yanosky, 2009).

1.1. Academic information

We classify academic information as all the information that is related to the teaching process. In this context, the central entity is the student, and we gather information about several indicators, such as student enrollment (type, sex, age, region of provenance …), educational success (percentage of approvals, dropout rate per year …) and teachers' schedule and load. Many other indicators and statistics can be obtained through the history of students' records.

1.2. Scientific, technical and artistic information

Under scientific, technical and artistic information we include the qualification of teachers, their degrees, date when each degree was obtained, how long did it take, and others. We also maintain record of the number, category, start and end date of each contract. A complete record of scientific publications, scientific projects and research units is also registered and accounted. This information allows directing resources to more demanding or urgent areas as well as to balance workload among teachers and departments. Another legal aspect, enforced by portuguese law, is the teaching staff evaluation process. Teachers are evaluated every three years in many aspects, including scientific, technological, organizational, cooperation and teaching. It is essential, for the management body of HEI, to have a complete record of the activities performed by teachers.

1.3. Cooperation information

Cooperation is also considered in the form of a record of cooperation projects, internationalization, internship organization and supervision among others. Many of the cooperation projects are responsible for research and development funding, in addition to supporting local economy and social development. Students are usually involved in such projects or initiatives, in the form of curricular internships or research grants.

Usually, the above mentioned information is varied and scattered through several departments and sections of HEI. Most of the times there is no business intelligence methodologies that can build on this information meaningful or useful information. In the following sections we describe a custom made data integration tool, which we call JagPAD, that has the ability to integrate information from students records, teachers' productivity in all the areas, institutional scientific repository management and contract management. Next, we start by describing the elementary database entities and proceed gradually to describe some of the features of the application.

2. Data and Data Integration

JagPAD collects data from several databases in the HEI, each under management of a different department or section (Figure 1). The information is stored in a local database, to allow making complex, inter-database queries without overloading the original database. Moreover, this approach allows creating middle-level tables, with pre-processed information that further enhances the quality of information.

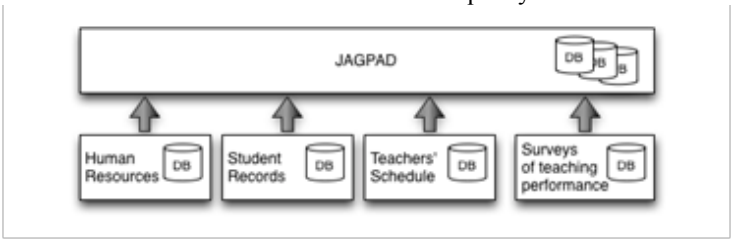

Figure 1. Data integration in JagPAD

The information retrieved from all these databases is converted to a structure of entities, where each entity groups data related the concept it represents. For example, a School provides several Courses. Each course's Plan changes through time, and it is composed of several Curricular Units (Figure 2). In this paper we chose not to extensively describe all the attributes of all the entities because it would be too verbose.

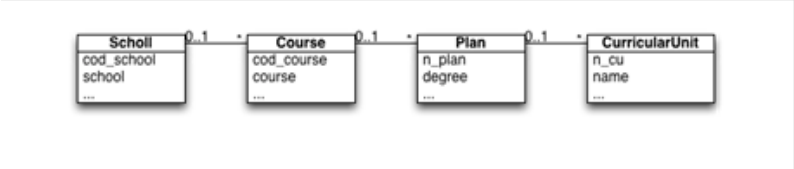

Figure 2. Curricular structure

The student records are associated to the previous structure, including a set of more entities, such as Enrollment (information about student enrollment), Grade (student grades and evaluation), Subscriptions, Country, District, and others. Still in relation to school, another branch of information stores information about the scientific structure, namely, Departments and Teachers. Additionally, there are many entities associated to a teacher (Figure 3). The DistServ entity represents the workload and schedule for each teacher. It changes at least every semester, and contains information about classes and curricular units he lectures. This entities also registers sabbatical periods and medical leaves.

Around the Teacher entity there are several other entities, to store information about research and cooperation Projects, qualification (Title), contracts (Category), organizational functions (Position), research units with which he collaborates and others.

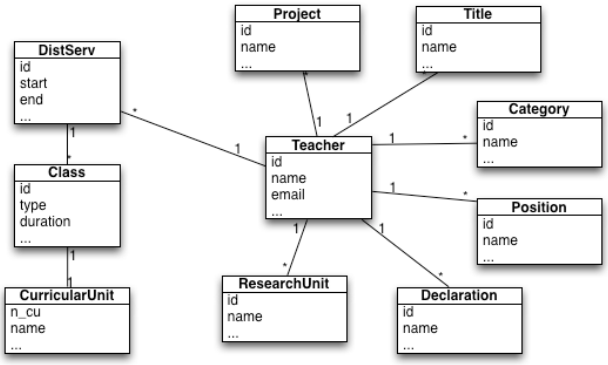

Figure 3. Teacher related information

3. Features and functionality

JagPAD presents a Graphical User Interface (GUI) with rich and flexible controls that allows the user to make pre-built queries and to generate reports. Each report contain tables, charts and graphs, to better illustrate the meaning of the information. JagPAD is structured in several independent modules, albeit interrelated, that can work standalone or in articulation with others. At the moment, it has the StoresQueries, Repository, HRM and TeacherService modules, described in the following sections.

3.1. Stored Queries

This module is built on the student records and academic information. It allows getting a full set of statistics and information from a large historical database (Figure 4). On the left side of the window there is a tree of queries. Queries can be added or changed at runtime, without needing to rebuild or redeploy the application. On the top of the window, it is possible to add filter conditions to the query, by selecting the school course, plan and curricular unit. Results are shown in the lower area in tabular format. Data can be exported to PDF, XLS and ODS, to be able to be processed in a spreadsheet. This module is also used to generate annual reports for the course commissions, containing several indicators related to success, dropout characterization of students and others.

3.2. Teachers' Service Allocation

According to portuguese law, teachers can accumulate up to 12 hours per week of contact hours. Service allocation is discussed in the school departments and approved in the scientific council. After approval, service allocation is used to produce teachers, classrooms and students schedules. Teachers are assigned to departments according to specific scientific areas. For example, it is possible to find departments of Informatics and Communication, Mathematics, Visual Arts or

Biology. Due to this structure, each teacher can supervise and lecture curricular units from different courses and each curricular unit can be lectured by more than one teacher. It is useful, from a management perspective, to get the broad picture of teacher/curricular unit relation, inter-department and through different courses.

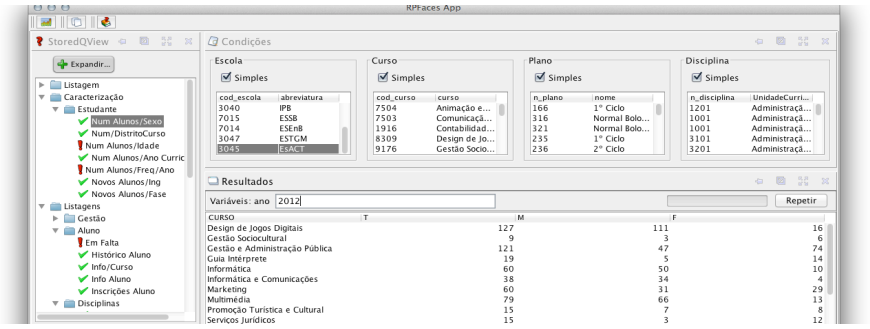

Figure 4. Stored queries for student records

In a single school there can be as much as 35 courses (CET, Licenciatura and Mestrado), totaling over 800 curricular units and 180 teachers. This amount of entities makes it very difficult to get a clear view of the situation. JagPAD allows building a graph connecting teachers, courses and curricular units, in an easier way to picture the service allocation (Figure 5). The graph is browsable, meaning that it can adapt the topology (manually or automatically), and changing the center, and consequently, the connections, through a simple click of the mouse. The information can also be exported in tabular format, used, for example to fill the self-evaluation report required by the A3ES.

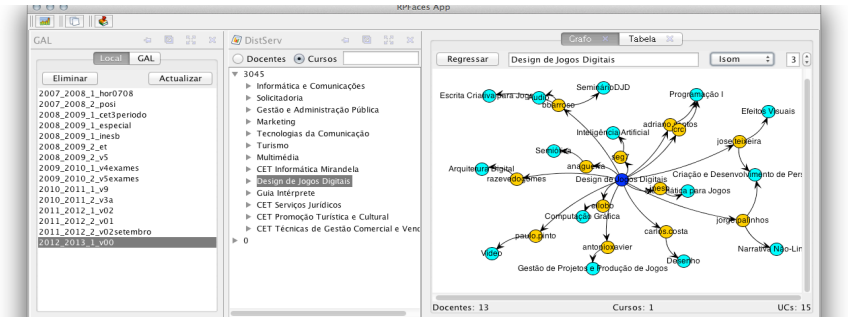

Figure 5. Teacher service allocation

3.3. Scientific repository

The scientific repository (Digital Library of IPB), promotes and provides open access to scientific literature produced by the IPB academic community, promoting integration, visibility and sharing of scientific information granting

the preservation of intellectual memory of the institution. According to the IPB regulations, only the papers and publications currently in the scientific repository are used for teachers evaluation. Papers are valued differently, according to the prestige of the publication and citation index. JagPAD allows retrieving statistics from the scientific repository, per teacher, per department or per school, giving the percentage of indexed papers and the overall percentage of publications among the different schools. This allows assessing the balance between schools and areas.

3.4. Human Resources Management

This particular module organizes all the information related to the teachers' qualification, contracts, organization activities, the full history of service allocation and others (Figure 6). To facilitate visualizing the information, it also presents the data in a bar chart, showing all the transitions, beginning date, end date following a color code.

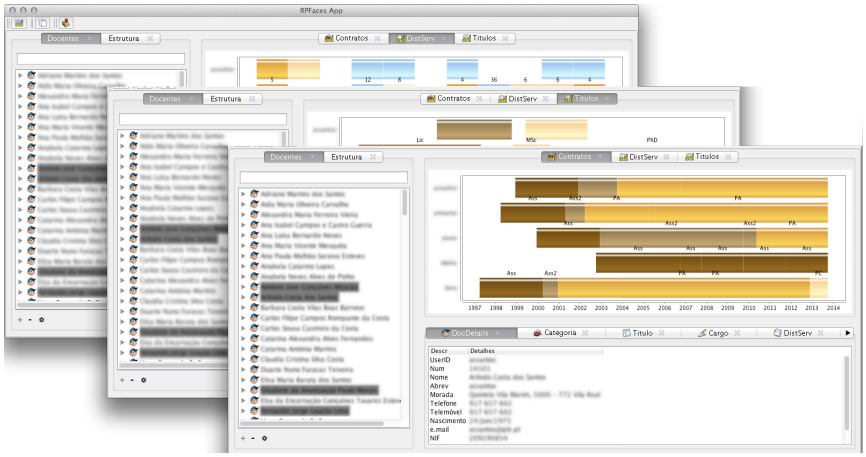

Figure 6. Human resources management

4. Conclusions

Management of higher education institutions poses several difficulties, resulting from the threefold mission of education, research and cooperation. The diversity of actors, such as teachers, students, non-teaching staff and community, generates very different information and situations, sometimes difficult to integrate. Usually, HEI are not ready to adopt a business intelligence view of the degree of compliance of the defined strategy and missions, relying on outdated and on unrelated pieces of information.

In this paper we described a custom made application, which we called JagPAD, to integrate information from several departments and sections, such as students' records, teachers' service allocation, scientific repository and others.

The application allows making queries and generating reports with integrated information, that can provide valuable insight into how the institution works and the degree of compliance with the adopted quality strategy. This application is currently in full use in the IPB, as a support for the management body and, in particular, for the courses commissions and pedagogical council.

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