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BUSINESS INTELLIGENCE IN HIGHER EDUCATION
Promoting the students success with a SRM system

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ABSTRACT

Promoting the students' academic success' requires the implementation of processes that allows theirs academic activities closely monitoring. Although essential, the activities involved in these processes do not take place in many of the Higher Education Institution (HEI). To overcome this complex problem, a conceptual framework and a technological infrastructure was proposed and integrated in a *Student Relationship Management - SRM* system. The *SRM system* supports the *SRM concept* and *practice*. To validate the *SRM system* relevance, it was implemented a prototype and it was implemented a set of application cases. This paper presents some of validation results.

 INTRODUCTION

The *students' academic success promotion* is a subject of great importance in a higher education context. Several studies have been undertaken in the Portuguese higher education context to identify and to analyze the students' failure and to propose measures against this problem. One of the measures frequently pointed out to increase the success promotion is associated to the students closely monitoring and with the approximation of the teacher/tutor to the students' day-by-day academic activities (Costa and Lopes 2008). Although essential, the implementation of the activities involved in this complex processes does not take place in many institutions mainly due to the lack of institutional practices in this sense, due the huge number of students with failure (namely in the first year of some graduation courses) and due to the work overload of the teaching staff (usually involved in teaching, researching and management tasks). To overcome this complexity, a conceptual and a technological infrastructure was proposed and integrated in a *SRM system*.

The *SRM system* supports the *SRM concept* and the *SRM practice,* also proposed in the scope of this project, and it was implemented using concepts and technologies associated to the *Business Intelligence* (BI) systems.

CONCEPTUAL AND TECHNOLOGICAL FRAMEWORK

The *SRM concept* it was proposed, as a process based on the students acquired knowledge, whose main purpose is to keep an effective *student-institution* relationship through the closely monitoring of the students and theirs academic activities. This proposal was based on the premise that there exists a strong correlation between the students closely monitoring and the academic success promotion. The *SRM practice* it is the set of activities that ensures the student personalized contact and the closely monitoring of his/her academic performance. The methodology adopted to validate the *SRM concept* and the *SRM practice* it was based on the *Grounded Theory* research methodology.

The *SRM system* supports the *SRM concept* and the set of activities included in the *SRM practice*. For that it is essential: i) To have adequate, consistent and complete data about the students, stored in an appropriate data repository, that allows maintaining a single view about the students; ii) To analyze the data stored in order to obtain knowledge about the students and their academic behavior; iii) To trigger automatic actions over the students, whenever specific situations or behaviors are detected; iv) To assess the impact of the undertaken actions over the students.

The structural issues related with:

i) and ii) requires a *data warehouse* system implementation and its exploration using *OLAP* and *data mining* tools.

iii) and iv) requires the behavior patterns identification, the actions definition; and the actions impact assess.

The *SRM system* architecture aggregates four components: The *Data Acquisition and Storage* component, responsible for storing the students' data, gathered from different data sources in a *data warehouse*. The *Data Analysis* component, responsible for obtaining knowledge about the students, through appropriates data analysis tools (OLAP, data mining). The *Interaction* component, responsible for maintaining an effective relationship with the students and the *Assessment* component, responsible for the carried out actions assess (Piedade and Santos 2008).

To validate the *SRM system* it was implemented a prototype and a set of application cases. The prototype shows the *SRM system* feasibility; and the application case shows the *SRM system* utility to the *SRM concept* and *practice* support.

The application cases were undertaken in a real context and involve the following processes: data acquisition and storage; data analysis; results interpretation; actions definition; and actions impact assess. More details about the application cases could be found in (Piedade and Santos 2009a; Piedade and Santos 2009b; Piedade and Santos 2009c). The data analysis process allows, among others, the students characteristics identification related with the academic failure and success. One of the behaviors that leads to the failure were clearly the students' not attends the classes. So, it was essential to fights against this trend. One of the actions to develop it was to alert in a regular basis the students' for his/her regular presences in classes thought automatic email alert messages'. This action that integrates the *SRM practice*, it was now supported by a *Web-SRM application.* This application has been in operation by way of trial in the course of a semester in the scope of a curricular unit.

After that, it is possible to confirm that the automatic *e-mailing* of the alert messages had a positive effect on the students' behavior, once in general the reaction is to make a personal justification and, also to attend the next classes. In mean more students attends the classes comparatively with the same period of the previous curricular year. With regard to the students' final assessments results, in percentage more students has been evaluated in the final exams comparatively with the previous curricular year, and more students have been success in the curricular unit (Piedade and Santos 2010). To take into account the trial results the alert messages sending to the students, contributes positively to the students' academic success promotion.

CONCLUSION

We believe that the *SRM concept* and the SRM *practice* implementation, supported by the *SRM system*, create an advantage towards the students' success promotion.

REFERENCES

Costa, A.F.D. and J.T. Lopes. 2008. "Os Estudantes e os seus Trajectos no Ensino Superior: Sucesso e Insucesso, Factores e Processos, Promoção de Boas Práticas*"*. Retrieved July 2011 from http://etes.cies.iscte.pt

Piedade, M.B. and M.Y. Santos. 2008. "Student Relationship Management: Concept, Practice and Technological Support". In *Proceedings of the IEMC-Europe 2008-IEEE International Engineering Management Conference (*Estoril, Portugal, June 28-30). ISBN 978-1-4244-2289-0.

Piedade, M.B. and M.Y. Santos. 2009a. "An Application of the Student Relationship Management Concept". In *Proceedings of the ICEIS 2009 - 11th International Conference on Enterprise Information Systems* (Milan, Italy, May 6-10) INSTICC Press 2009, pages 360-367. ISBN 978-989-8111-85-2.

Piedade, M.B. and M.Y. Santos. 2009b. "Business Intelligence Supporting the Teaching-Learning Process". In *Proceedings of the 5th WSEAS International Symposium on Data Mining and Information Processing* (Budapest, Hungary, September 3-5). WSEAS Press, pages 292-297, ISBN:978-960-474-113-7.

Piedade, M.B. and M.Y. Santos. 2009c. "Business Intelligence in Higher Education Institution: Managing the Relationships with Students". In Proceedings of KDIR - International Conference on Knowledge Discovey and Information Retrieval (Funchal, Madeira, Portugal, October 6-8). INSTICC Press 2009, pages 297-302, ISBN 978-989-674-011-5.

Piedade, M.B. and M.Y. Santos. 2010. "Promoting Students Success with a Business Intelligence System". In Proceedings of CSEDU - 2nd International Conference on Computer Supported Education. (Valencia, Spain, April 7-10). INSTICC Press 2010, pages 46-52, ISBN 978-989-674-024-5.