School Performance Analysis from a Scholastic Learning Process

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ABSTRACT

In this study, the authors describe the design and use evaluation of a system that allows the academic behavior analysis of high school students using a data model based on business intelligence techniques. Based on the system data analysis information can be extracted and the right decisions taken in order to help and improve the student academic performance. From the design and implementation of the model, the relationship between the study habits of students and their academic performance is studied. More specifically, it aims to validate the initial hypothesis that there is a relationship between study habits of students and their academic performance. Based on the analysis it is concluded that the initial hypothesis is true. The proposed model also allows the extraction of information to other levels, where its primary objective is the application to improve the academic performance of students or to prevent situations of academic failure.

KEYWORDS

Academic Performance, Business Intelligence, Decision Support Systems, Educational Innovation, Learning Consolidation, Learning Strategies, Student Motivation, Study Habits

1. INTRODUCTION

Currently one of the main problems in schools, both in high-schools and professional training levels is the low academic performance and more worryingly, the school dropout. Multiple reports highlight this fact, especially in the Spanish educational system with indexes that are below the European average (Fernández, Mena y Riviere, 2010; Martín, 2007). In Spain, the percentage of the adult population with a high school education, professional training or higher degrees is 54%, way below the European average (77%) and the average in OECD (76%). This is alarming since this education is key to acquire the knowledge and the abilities necessary to enter both the job market and university. The access rate to university education in Spain is also lower than the EU average. In Spain and in most EU and OECD countries, people with a high level of studies reach a higher rate of employment while people with a lower level of studies have a higher risk of unemployment.

On the other hand the public spending per student in Spanish educational institutions slightly exceeds (4%) the EU and OECD averages. Therefore, although there are many factors involved, it seems clear that the competitiveness of the Spanish educational system needs to be improved.

Even if it is a complex problem with many factors involved (political, social, demographic, teaching…), there is some possible changes for improvement. Once the problem has been identified, a set of actions can be proposed and implemented to minimize it or, if possible, solve it. For this reason, it is important to obtain as much information as possible related to the student’s academic
performance and its associated factors. This information and its subsequent analysis should allow both the verification of facts and the proposal of actions to maximize this performance.

With a business-oriented approach, the metric that allows to quantitatively measure the student’s learning level is their qualification results. These are related to the rest of the system’s variables. The present proposal uses a business data model in an educational environment based on Business Intelligence (BI) systems and Decision Support Systems (DSS).

2. BACKGROUND AND STATE OF THE ART

There are numerous examples from recent years of the incorporation of all types of applications and systems into classrooms at all educational levels to improve teaching, especially to improve student motivation. In preschool and early childhood education, the use of digital chalkboards and very basic web applications are enabling new ways to teach subjects such as math, languages, and science (Beauchamp & Parkinson, 2008; Freeman, Eddy, McDonough, Smith, Okoroafor, Jordt & Wenderoth, 2014). In primary school, the increasingly complex use of computers and applications, which recently has even included the programming of robots, are innovations that directly impact the attention and comprehension levels of students, where the technological and social profiles of the student begin to illuminate the final answer (Volman, Eck, Heemskerk & Kuiper, 2005; Petre & Price, 2004). Beginning in secondary school, there is a challenge to incorporate mobile devices belonging to students, such as smartphones and tablets, into educational use through collaborative practices (and even gaming methods) that complement their social use (Leask and Pachler, 2013).

On the other hand, is easy to find multiple studies that analyze academic performance and the students learning process. These are based on different factors, personal variables and environment variables which are classified as external and internal factors (Mella y Ortiz, 1999). These factors could be personal and family-related which in some cases lead to school dropout in high school students (Díaz, 2003). This fact highlights the direct influence of the student’s parent’s academic level, the gender, the motivation and the social relationships as relevant external agents in the improvement of academic performance. Other studies (León, 2008) evaluate the students’ concentration and attention as an internal factor that demonstrates the positive proportionality between concentration and performance.

Considering previous recommendations and logical assumptions based on cognitive studies, such as that by Gantt (1998), we can state that humans have a low capacity for retention, which varies greatly depending on how they experience their surroundings. It is widely recognized that approximately 25% of what we hear is retained, a proportion that increases to 75% if a specific action is performed. Based on these results, it seems vitally important to move from the traditional lecture class to other models that produce a higher rate of retention. Undoubtedly, this paradigm shift sustains the PBL concept and other, more generic concepts, such as Internet 2.0 or 3.0, which allow the user (in our case, the student) to transition from a passive consumer to an active generator of content.

Systems such as Wikipedia, social networks and various technological innovations in general (especially mobile devices) have improved the processes of interaction and every type of learning by users to access content in a friendly way. In this regard, numerous types of studies have linked the use of ICTs with improved student motivation and, correspondingly, academic performance (Callaway, 2009; Fonseca, Martí, Redondo, Navarro & Sánchez, 2014). While focusing on the study of user behavior and emotions, we cannot forget its connection with the area of widely documented knowledge corresponding to user experience and usability (UX). These areas are historically related to the field of human-computer interaction (HCI); from that perspective, it would be interesting to analyze any innovation that involves the use of new computer systems or technologies (Hassenzahl & Tractinsky, 2006). This new paradigm is desirable as an optimal learning model, allowing student involvement in the subject and content and the ability to study collaboratively. In accordance with Massy & Zemsky (1995), any methodology that promotes the inclusion of IT in teaching must have the following objectives:
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www.igi-global.com/article/how-can-agile-methodologies-be-used-to-enhance-the-success-of-information-technology-projects/150532?camid=4v1a

ERP Usage in Practice: An Empirical Investigation
www.igi-global.com/article/erp-usage-practice/1284?camid=4v1a