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CONTENTS

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Title

APPLICATION OF ANALYTICAL TOOLS IN STUDENT RETENTION SYSTEM

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Abstract:

Higher education is learning that is provided by universities, vocational universities, degree colleges, arts colleges, technical and medical colleges, and other institutions that award academic degrees. Higher education is normally taken to include undergraduate and postgraduate education, as well as vocational education and training. Colleges and universities are the main institutions that provide higher education. Higher education is now subject to heightened scrutiny as government, accrediting agency, parents and donors call for new ways for monitoring and improving students' success. For the purpose of accountability, institutions are being asked to present data that document their accomplishment. These data is generally gathered by accrediting agencies. The modern analytical and statistical techniques can be used to analyze the students' data and develop predictive model. This model may help in predicting which students might be in academic difficulty, allowing faculty and advisors to intervene. In turn, this will lead to improvement in teaching, learning, and student success. Thus, such techniques may become a valuable tool in institutional improvement and accountability.

Introduction

Academic systems such as course management and student response systems generate a wide array of data that may relate to student effort and success (retention and graduation). Analytical techniques together with statistical techniques and predictive modeling help institutions to improve decision-making. Current initiatives use such data to predict which students might be in academic difficulty, allowing faculty and advisors to intervene (with instruction tailored to students' specific learning needs, for example). But if analytical tools based on data mining techniques has the potential to improve teaching, learning, and student success. With its ability to model, predict, and improve decision-making, such tool may become valuable in institutional improvement and accountability. IT and institutional leaders need to understand the analytical capability that must be employed for the purpose, as well as the changes that might be required in data standards, tools, processes, organizational synergies, policies, and institutional culture.

Importance of College Education:

Education—and higher education in particular—plays an important role in the economic health and competitiveness of individuals and of the nation. Educational attainment is strongly correlated with higher income and other economic benefits for individuals; with improved social conditions; and with benefits to colleges and universities.

Individual Benefits

Full-time workers with postgraduate degree earn 62 percent more than workers with a high school diploma. College graduates are more likely to receive a variety of employer-sponsored benefits, such as health insurance or pension plans, and they rate themselves as being in better health than those who have not attended college.

Benefits to Society

The Indian economy is of mixed type and it provides equal opportunities to public as well as private sector. The earnings of college graduates generate higher tax payments as well. College graduates working full time paid 134 percent more in federal income taxes and 80 percent more in total federal, state, and local taxes than the typical high school graduate. Due in large part to higher rates of employment and better salaries, college graduates are less dependent on public support programs (Medicaid, food stamps, subsidized school lunches) than high school graduates, and the children of parents with higher levels of educational attainment are better prepared for school and are more involved in all types of extracurricular activities.

Institutional Benefits:

Retention of students saves institutions the cost of recruiting students to replace those who withdraw without completing a degree. The loss of students can also result in lost revenues for the institution's bookstore, food services, and other areas. From virtually any perspective, student success is worth working to improve.

Related Work:

The data mining application in the area of education is wide spread. A number of researchers have proposed models for application of data mining techniques in the field of higher education. . Each of them is trying to enhance the educational system by discovering patterns among the great deal of data. In [5], Jing Luan has addressed the capabilities of data mining through four case studies. The first case study is done with the aim of creating meaningful learning outcome typologies for students at various educational levels. The raw data used in this analysis are student educational outcome in combination with length of study. The outcome is sets of student clusters including; "Transfers" "Vocational students" "Basic skill students" "Student with mixed outcomes" and "dropouts". Clustering analysis is the most appropriate technique used in this study. The use of data mining in this case study helps educational system to better describe the clusters of homogeneous groups of students and create a series of typologies with predefined name. Therefore the lecturers and administrators can make more advanced plan on each group. Future work of this study was conducted to determine length of study, which required decision how to deal with students, or the one who left a while and hack later for more. Luan [5] studied the impact of data mining on higher education. This study helped to gain insights about the existing higher education worldwide and its improvement from data mining perspective. In [7], Delavari et al (2004) discussed a new model for using data mining in higher educational system. In [6], Barros and Verdejo (2000) analyzed the student interaction process and applied to improve collaboration.

Research Methodology:

Collect Data:

Data may be collected from multiple sources (such as an Student Information System, a Course Management System, or financial systems) and in multiple formats (such as spreadsheets, enterprise financial system reports, or paper records). Moreover, data can originate inside or outside the institution. Managing these and other variables in the collection, organization, and rationalization of data can be a considerable challenge but is vital because decisions based on data hinge on the quality and integrity of that data.

Selecting and Organizing Data:

Institutions collect a wide array of data about students and courses. One of the first questions to ask is which data could provide useful insights. Different types of data are collected about the students – demographic, academic ability, academic performance, and academic history, financial and so on. Extracted data are migrated to a data warehouse (also called a data repository), which houses data from one or more systems, integrates it, and makes it available for analysis (modeling or data mining). Storing data in a warehouse enables complex queries and analysis without disrupting or slowing production systems. For example, course management data might be extracted nightly and stored in a data warehouse where they are matched and merged with other student data, such as attendance information or clicker data. Integrating and storing data in a single place ensures that various prediction models all use the same data.

Report:

Once the data have been extracted and stored in a common location, staff equipped with query, reporting, and analysis tools can perform queries, examine the information, and identify trends, patterns, and exceptions in the data. Descriptive statistics (mean, standard deviation) are often generated. For example, data from the SIS can reveal enrollment trends within a discipline. Correlations might also be run. In analytics projects, traditional reports (tables of data) are increasingly being replaced with "dashboards" that graphically show data in comparison to goals or targets, making the reports easy to scan.

Predict:

Data that have been collected and warehoused are analyzed using statistics. The rules governing the models can be simple or extremely complex, based on numerous data points and statistical algorithms to generate predictions. For example, a regression model using data from the SIS, the financial system, and class attendance data might predict the student's likelihood of returning the following year. When data indicate that a student has limited

preparation in mathematics and has not attended class for several sessions, a rule might raise a red flag that the student is at risk for failing the course.

Developing a Model:

The development of predictive models will vary based on the type of data and the nature of the question. Predictive models typically use statistical regression techniques to develop a probability. Each regression technique has its limitations: some are susceptible to missing data, while others require numerical data (versus categorical data). Predictive modeling requires expertise in statistical analysis. Collaboration with the institutional research, statistics, or education departments might be necessary during model development.

Act:

The purpose of analyzing student data is to enable an institution to act based on predictions and probabilities. Actions might range from "information" to "invention." For example, students might be provided with information in the form of an educational progress dashboard where they can view their progress toward a degree, comparisons with their peers, and possibly suggestions on how to improve. At the other end of the spectrum, if the model predicts that a student could be at risk of dropping out of school, the advisors or faculty might be triggered for an intervention designed to change student behavior and improve learning. That intervention could be an automated, technology-mediated contact or a personal phone call or e-mail from an advisor about study skills and resources, such as help sessions or office hours. Institutions should create mechanisms for measuring impact, such as whether students actually came to office hours when invited.

Appropriate Interventions:

- When deciding on what interventions to use with students, consider the following:
- What does the research say? A research review will help you narrow the potential range of interventions, targeting those that have proven most effective.

What does experience say? For some faculty or student affairs staff, selection of the best interventions may come from a "gut feeling" based on years of working with students.

Determining Number of Interventions:

The number and type of interventions will largely depend on the project. If the goal is to improve course retention, the interventions might increase in "intensity" as the semester progresses. The initial contact could be in an e-mail informing the student of expectations; future interventions could include required attendance at help sessions.

Conclusion:

The predictive model based on analytical techniques will help in identifying students' at-risk students and to establish interventions that improve the likelihood of their success. Students might welcome predictive information because it will help them improve their performance. The predictions could provide the needed encouragement for students to be successful in a class. Although some students might welcome a prediction of future success along with steps to improve achievement, others might be concerned they will be judged incorrectly or misunderstood. But such a system will definitely increase the efficiency of a higher educational institute.

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