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The Increased Utilization of Analytics and How Academic Programs Are Responding to Job Market Demands by Leveraging Predictive Modeling with SAS® Enterprise Miner™ Certification

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ABSTRACT

According to Gartner, more than 90% of global 2000 companies have incorporated, or plan to incorporate, analytics into their business applications. This increased utilization of analytics will likely correspond to an increased demand for career professionals with strong analytic skills. This paper examines how academic programs are responding to this need by incorporating the Predictive Modeling with SAS® Enterprise Miner™ certification exam into their existing curricula.

INTRODUCTION

It is common practice for those seeking to enter the business and technology industries to earn one or more credentials from well known IT vendors. Credentials provide value in many ways and are often used to fast track one's entry into the job market. Given the plethora of credentials from which to choose, selecting the right credential can often be a daunting task.

In some cases, earning a particular certification is a job requirement, thereby making the decision for pursuing a specific credential clear. In other instances, the path is not as straightforward and much thought must be given to the decision as earning a credential can require a substantial investment in training and a mastery of the particular subject domain. Given that many candidates look to certification as a way to fast track entry into the job market, knowing where the market is headed can serve as a valuable indicator of which credential might represent the best investment and provide the best leverage in the job market.

MARKET DEMAND

One particular area that is showing strong growth is analytics. This trend is evidenced by surveying titles of the current top selling business publications. *Competing on Analytics: The New Science of Winning* (Davenport, T & Harris, J., 2007); *Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart* (Ayres, I., 2007); and *The Numerati* (Baker, S., 2008) are three well respected and well read publications. Each of these publications explores the premise that companies that have moved beyond simply collecting and storing vast amounts of data and instead utilize data to drive decision making is the impetus that gives these companies their advantage in the market place.

Not only is analytics a staple of what business professionals are reading, but companies are also making substantial investments into enterprise business solutions. In fact, businesses are utilizing analytics now more than ever in their efforts to remain competitive in today's global economy. According to Gartner, greater than 90% of global 2000 companies report having or planning to incorporate analytics engines into their business applications (Beyer, 2007).

This increased utilization of analytics within the business world will undoubtedly correspond to an increased demand for career professionals with strong analytic skills. The ability for businesses to see substantial returns on their business solution investments is directly tied to whether or not they have career professionals who are capable of utilizing these products to their fullest potential. One area in particular on which businesses are becoming increasingly dependent is in the area of data mining and predictive modeling.

While the ability to report on what happened in the past has long been a staple of business, in today's economy it is simply not enough. To keep up with or to get ahead of the competition, businesses must be able to make decisions that maximize productivity and increase profit, all while minimizing cost and eliminating waste if at all possible. These types of decisions require the ability to know with some certainty what will likely happen in the future. Questions like "which prospect to pursue, what product to promote, how much product to manufacture, and how much credit to extend" are all questions that depend upon having some idea of what to expect moving forward. To answer these types of questions, businesses rely on analytics such as forecasting, data mining, and predictive modeling.

As companies incorporate more and more of these types of analytics into their business applications, the demand for career professionals capable of conducting and interpreting these types of analyses, as well as the ability to translate these findings and drive decision making will be at an all time high. Many university programs have recognized this trend and are offering programs specifically designed to address this growing demand in the job market. As with any problem, there are often multiple ways to achieve an acceptable solution.

University programs can be flexible by their very nature, and the most direct approach would be to simply teach to the demand. However, this approach addresses the demand in isolation and does not seamlessly unify the gap between theory and application. This particular issue is often one of the reasons new graduates have difficulty securing a job. The combination of knowledge and experience is a powerful one, and many university programs have now moved beyond the notion of providing internship opportunities to the top students. Instead, they have incorporated direct business experience into their curricula so that all students can benefit from this type of engagement model.

MEETING THE MARKET DEMAND

University degree programs that include a fundamental understanding of the principles of business and analytics, as well as provide opportunities to develop hands-on experience solving real world business problems are becoming a much sought after resource in today's job market. Companies are recognizing the need to partner with universities and to begin developing talent well before a student crosses the platform and earns a degree. In several university programs, businesses provide real data and give students the opportunity to help solve their business problems. The benefits of this type of engagement model can easily be seen. Students get to apply their learning, gain hands-on experience, further the development of their speaking and problem solving skills, as well as begin to build their network of business contacts. Companies, on the other hand, gain access to career professionals before they enter the job market, as well as get the opportunity to directly influence the type of skills these individuals are equipped with when they enter the work force.

There are currently 20 university programs that have partnered with SAS to provide students with a certificate awarded jointly by the university and SAS in the area of data mining. Each of these programs involves course work in data mining, as well as project work for which students must use enterprise business solutions to solve real business problems. The three leading programs in the United States that have incorporated this joint data mining certificate were all early adopters of this engagement model and are run out of the University of Central Florida, the University of Alabama, and Oklahoma State University. These three programs have taken the engagement model one step further and have incorporated the option for students to sit for a SAS certification exam and potentially earn an industry recognized credential. This takes the level of assessment beyond that of a certificate and allows students the opportunity to put their skills to the test against the benchmark developed for the industry. This paper will focus on the largest of these three programs, a program for which certification has been incorporated and is now a core component.

OKLAHOMA STATE UNIVERSITY

At Oklahoma State University, the SAS/OSU data mining certificate program has been highly successful at using this model of engagement. OSU's Spears School of Business partnered with SAS in 2004 to start the data mining certificate program. Masters students from different disciplines (MIS, MBA, Industrial Engineering, and Statistics) take approved courses to earn this certificate. In the last four years, more than 150 students have earned SAS/OSU data mining certificates. OSU is currently the largest provider of such data mining certificates among all U.S. universities. OSU's data mining program is also unique in the sense that it is housed in the school of business (Marketing and MIS departments) while most of the data mining certificate programs in other universities are housed in the statistics or computer science departments.

The SAS/OSU data mining certificate program curriculum was carefully designed by faculty from OSU in consultation with SAS to achieve following objectives. First, students were expected to receive a broad-based exposure, not just to data analysis but also to data extraction and data management issues. This is important because in the real world, more than 70% of data miners' time is spent in data pre-processing activities such as data cleansing, and data manipulation. Second, given the intent of this program to appeal to students from various disciplines, interdisciplinary content of courses were emphasized. Thus, courses were chosen (in many cases existing courses were completely redesigned and in some cases brand new courses were developed) from departments such as Marketing, MIS, Statistics, and Industrial Engineering. Third, the business applications were emphasized in all course work. In particular, in one of the core courses, students were expected to complete a major data mining project for a real company. This meant close collaboration with businesses that provided real data for students to analyze and come up with realistic solutions.

The current structure of SAS/OSU data mining certificate program is as follows. Students are required to take two core courses: database marketing and data mining. They also choose two electives from courses such as advanced data mining applications, advanced database management, decision support and expert systems, data, process and object modeling, and others. The complete details are available at:

<http://spears.okstate.edu/future/graduate/degrees/certificate/sasosu/program>. While the program started with the intention of training full-time masters students, an online version of the program was introduced in 2007 due to market demand from part-time students and working professionals who could not come to Stillwater to attend classes. The structure of the online program is very similar to that of the program delivered via traditional class room instructions with minor modification to accommodate the online delivery. The details for the online version of the program are available at: <http://spears.okstate.edu/future/graduate/degrees/certificate/datamining>.

While the SAS/OSU data mining certificate program allows students to understand and develop their data mining and predictive modeling skills by taking focused courses in those areas, employers often look for verifiable skills in potential hires beyond simply completion of courses. Thus, when SAS introduced the Predictive Modeling Using SAS Enterprise Miner certification exam in 2006, it was adopted as a core element of the data mining class at OSU. In the first year of adoption of the certification exam (Spring 2007) as a part of the OSU's data mining class, the results were unsatisfactory. Only 20% of the students in the data mining class actually passed the certification exam. This was surprising given that these students performed very well in other areas such as earning top spots in data mining tournaments and producing excellent analysis in their business projects. A deeper analysis diagnosed that while the students were conversant with the issues and concepts covered in the certification exam, they were not proficient in using SAS Enterprise Miner under time constraints. The Predictive Modeling Using SAS Enterprise Miner certification exam is a timed exam for which candidates are given three hours during which time they must use SAS Enterprise Miner to perform various actions in order to answer the examination questions. In-depth interviews with students revealed that this may have happened due to the way academic courses are typically structured. Students typically are given a week to complete data analysis problems and often perform their course work either alone or in groups.

Therefore, the data mining class had to be redesigned so that students are given enough hands-on experience in analyzing data with SAS Enterprise Miner under realistic time constraints so that they can successfully pass the credential exam. In Spring 2008, the data mining course was split up into theory and lab sections. Each week, in the theory sections, students are first exposed to theoretical concepts and issues about data mining and modeling. During the theory sessions, the instructor also demonstrates using SAS Enterprise Miner for topics covered in the session. In the data mining lab sections, students are then asked to apply what they learned in the theory sessions. The lab sessions are run under realistic time constraints where students use SAS Enterprise Miner to solve business problems using real data from companies. When OSU students from the redesigned data mining class appeared for the predictive modeling certification exam in Spring 2008, the results from the restructuring of the course was obvious. Almost 60% of the students passed the certification exam in Spring 2008.

CONCLUSION

Students from OSU's data mining certificate program have been hired by many well-known companies such as Amazon, Citibank, Harte-Hanks, HSBC, Pfizer, Travelocity, and others. Many of these companies have never hired OSU students before the data mining certificate program was offered by OSU. Undoubtedly the completion of data mining certificates, real-world data mining projects and experience with data mining software play important roles in job placement. The predictive modeling certification credentials also make a big difference in students' ability to get data mining jobs at companies. In fact, in the last two years, OSU students getting better placements have one thing in common: they all have successfully completed the predictive modeling credentials in addition to getting their data mining certificates.

Companies today are faced with business problems that often involve data consisting of millions of records, substantial costs associated with bad decisions, and pressure to show returns on investment with minimal time. Even with the substantial investment these companies make in enterprise business solutions, harnessing the full potential these products provide is possible only when companies have in place career professionals with strong analytic skills, a fundamental understanding of the processes involved with these types of problems, and the ability to fully utilize the software. University programs like the one at Oklahoma State University are allowing companies to more fully leverage their investments by providing programs that produce career professionals with the knowledge and capability of making contributions directly upon being hired. This type of engagement model is of mutual benefit to both the university program and the business market and, therefore, is one that is expected to continue to see strong growth.

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