

ONLINE MS IN BUSINESS ANALYTICS BEST PRACTICES AND BEYOND

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ABSTRACT

The demand for talent in analytics has significantly outpaced supply, prompting institutions of higher learning to develop related curricula to address this unmet market need. One degree offering that has proliferated is the online Master of Science (MS) degree in business analytics. Unlike the more general MBA with a concentration in analytics, this specialized master's degree usually includes advanced coursework in areas related to the three subject area domains (descriptive, predictive, and prescriptive analytics). These types of courses, such as statistical modeling, optimization, and computer programming, involve technical and quantitative skills that can pose unique challenges in an asynchronous online learning environment. Moreover, with the explosive growth in job opportunities, prospective students may be drawn to the MS in business analytics without understanding fully the advanced nature of the curriculum or the prerequisite knowledge needed to succeed. With the goal of better positioning prospective students for success in the MS in business analytics, we approach the issue in two different ways. First, we benchmark the top ranked online MS business analytics programs in the US to uncover best practices with respect to curriculum as well as the online application and admissions screening process. Second, we consider strategies for increasing student engagement in asynchronous online learning environments suitable for use in advanced online business analytics courses.

KEYWORDS

Business Analytics, Benchmarking, Admissions, Student Engagement, Asynchronous Learning

1. INTRODUCTION

As organizations in every industry face the challenge of leveraging big data for competitive advantage, the demand for talent in analytics has significantly outpaced supply. Employers seek professionals that possess a mix of data analysis, information technology, and business skills. Several similar, yet distinct, academic programs of study have emerged to address industry needs. These include business intelligence, data analytics, data science, and business analytics. While the audience for data-oriented degrees is large and expanding, it is not homogeneous. Even within business analytics, programs differ in level (undergraduate versus graduate), focus (general versus specialized), and mode of delivery (traditional versus online).

The Institute for Operations Research and Management Science (INFORMS) defines analytics as the scientific process of transforming data into insights for the purpose of making better decisions (www.informs.org) and categorizes it into three domains (descriptive, predictive, and prescriptive). The Master of Science (MS) degree in business analytics is a specialized program with an emphasis on advanced techniques for analyzing structured and unstructured data to gain insights for better decision-making.

It has been suggested that the graduate level is ideal for business analytics education (due to the prerequisite of specific knowledge) and that business schools provide the needed integration of information systems, statistics, and management science with business domain knowledge (Hsinchun, et al., 2012). Parks, et al. (2018) analyzed MS programs in business analytics using the classification scheme proposed by Chiang et al. (2012). This scheme involves (1) IT knowledge and skills used for descriptive analytics, (2) analytical skills that integrate the disciplines of statistics and computer science used for predictive analytics, and (3) business knowledge and communication skills used to support prescriptive analytics. Of the 62 programs evaluated, only 22 were online. Among the most popular analytical skills were data mining, statistical analysis, optimization, and simulation. Although the *average* percentage of total credit hours devoted to each category was about the same, the study found substantial disparity across programs with respect to focus and

topic coverage due, according to the authors, to a lack of alignment with industry needs.

Efforts have increased to identify (and close) the gaps between industry requirements and academic curricula. Paul and MacDonald (2020) stress that courses must address all core business analytic areas: Descriptive Analytics (i.e., what happened: data visualization techniques), Predictive Analytics (i.e., what might happen: forecasting and statistical modeling techniques), and Prescriptive Analytics (i.e., what actions should be taken: optimization and simulation techniques) (see Figure 1). Furthermore, they note the importance of ensuring student success in business analytics graduate programs by admitting those that possess the necessary prerequisite knowledge (e.g., statistics) and personality traits (e.g., recommending interviews as part of the application process).

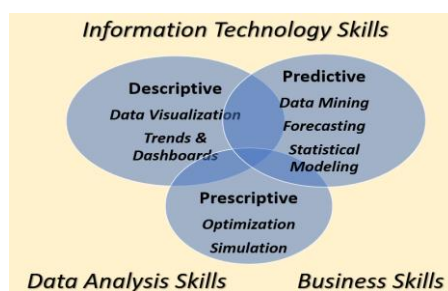


Figure 1. Three domains of business analytics within the framework of professional skills

With the goal of better positioning prospective students for successful completion of the online MS in business analytics, we undertake a benchmarking study of the top ranked programs in the US. Unlike previous studies, we focus solely on the *online* MS in business analytics delivered asynchronously. These programs have been increasing in number, not surprisingly, given the unmet and growing demand for analytics professionals as well as the advantages this mode of delivery offers (i.e., convenience and flexibility). However, the technical and quantitative nature of this specialized graduate program may pose challenges to students in an asynchronous online learning environment. Furthermore, the explosive rise in job opportunities may attract prospective students to the online MS in business analytics who do not understand fully the advanced nature of the curriculum, or the prerequisite knowledge needed to succeed. Consequently, our benchmarking study is not only directed toward examining best practices with respect to curriculum, but also with respect to the online application process. In our view, this has become increasingly important in light of the pandemic's impact on standardized testing (e.g., GMAT). With many institutions waiving the standardized test as a requirement, it is critical that the online application process both conveys and collects relevant information to attract and effectively screen suitable applicants for admission.

Engagement plays a key role in student learning, and it is evident that online students in remote asynchronous environments engage with content differently than students in traditional face to face settings (Meyer, 2014; Mayer, 2019). Business analytics is a STEM-designated program (Science, Technology, Engineering, Math). In order to enhance student engagement, we consider how strategies shown to be effective in other online STEM-designated programs (Al Mamun and Lawrie, 2023) may be adapted for advanced online business analytics coursework.

2. BEST PRACTICES

The programs included in the benchmarking study are those that appear on the most recent list of “best online master’s in business analytics degree programs” as ranked by *Intelligent* (<https://www.intelligent.com/best-online-masters-in-business-analytics-degree-programs>). All institutions are non-profit (public or private) and many programs on the list are accredited by AACSB (Association to Advance Collegiate Schools of Business). The website for each online MS program in business analytics is visited and data are gathered on benchmarking criteria broadly classified as relating to (1) information available on the website and (2) the website itself (features and functionality).

Benchmarking criteria related to information available on the website are either program specific (e.g., completion time) or convey expectations about what is required to succeed in the program

(e.g., preferred undergraduate major). Benchmarking criteria related to the website itself include features (e.g., ability to translate into multiple languages) and functionality (e.g., ease of navigation).

2.1 Benchmarking

The top 30 programs on the list are benchmarked for this study. The top 10 programs on the list are ascribed a “tagline” by *Intelligent*. These programs and their taglines are (#1) Boston University (*Intelligent Pick*), (#2) Texas A&M University (*Best Public Institution*), (#3) University of Maryland (*Fastest Completion Time*), (#4) Indiana University (*Best for Adult Learners*), (#5) Arizona State University (*Most Flexible Start Terms*), (#6) Syracuse University (*Best Private Institution*), (#7) Oklahoma State University (*Best Electives*), (#8) Maryville University (*Most Affordable*), (#9) William & Mary (*Most Innovative Curriculum*), and (#10) Stevens Institute of Technology (*Best Job Placement*). Table 1 shows the remaining 20 programs that round out the top 30.

Table 1. Online MS Degree Programs on Intelligent List

#11 Iowa State	#16 MIT	#21 Ohio University	#26 U Mass Lowell
#12 Penn State World	#17 Drake University	#22 West Virginia Univ.	#27 U Tennessee Chattanooga
#13 American University	#18 U of Nebraska	#23 Quinnipiac	#28 Lewis University
#14 Purdue University	#19 Pepperdine	#24 Southern Methodist	#29 U Texas Dallas
#15 Worcester Polytechnic	#20 Carnegie Mellon	#25 NYU	#30 U N. Carolina Wilmington

Table 2 shows the percentage of programs that display specific types of program information on the website (for the 30 programs as well as just the top 10). Program specific information includes cost, credits, completion time, job opportunities, and curriculum. The top 30 programs require between 21 and 54 credits (average of 32.73), with all top 10 requiring at least 30. Costs range from \$14,910 to \$86,300 (the average being \$43,116). In the top 10, Maryville tagged *Most Affordable*, costs more than Oklahoma State. Only 70% of the top 30 programs provide an estimate of completion time, which ranges from 9 months to 3 years. The University of Maryland, tagged *Fastest Completion Time*, lists 16 months. Over half of the programs include information about job prospects after graduation (job titles and salary) and all list specific courses on the website. Our focus is on six courses we believe best meet current industry needs and/or are considered innovative. Given that most employers of analytics professionals cite programming skills as desirable, it is not surprising that courses in Python and R are prevalent in the top 10 programs. Although we expected to find a course in data visualization as well as a capstone course across all programs, these are not offered in 23-30% of the top 30 (or in 40% of the top 10). Very few (none in the top 10) offer a course in data ethics. Finally, William & Mary, tagged as *Most Innovative*, does not stand out as substantially different from the others, at least with respect to these six courses.

In order to gauge the extent to which program websites convey to prospective students what is necessary to succeed in the online MS in business analytics, we examine information provided on admissions criteria (see Table 3). All programs list admissions criteria on their websites. All top 10 include the preferred undergraduate degree, which is important given the specific prerequisite knowledge needed for advanced coursework in business analytics. This drops to 83% among the top 30, although 93% do list the minimum acceptable undergraduate GPA. The majority no longer require applicants to submit scores on either the GMAT or GRE.

Table 2. Program Specific Information Available on Website

Specific Information	Top 30 (% Yes)	Top 10 (% Yes)
Job Titles Listed?	53 %	60 %
Job Salaries Listed?	50 %	60 %
Specific Courses Listed?	100 %	100 %
Data Visualization Course?	77 %	60 %
Python Course?	70 %	80 %
R Programming Course?	77 %	80 %
Capstone Project Course?	70 %	60 %
Artificial Intelligence Course?	73 %	60 %
Data Ethics Course?	17 %	0 %

Table 3. Admissions Information Available on Website

Specific Information	Top 30 (% Yes)	Top 10 (% Yes)
Admissions Requirements Listed?	100 %	100 %
GRE / GMAT Required?	33 %	40 %
Preferred UG Degree Required?	83 %	100 %
UG GPA Requirement?	93 %	90 %

Finally, we go beyond benchmarking program specific information to evaluating the website itself. Table 4 shows benchmarking results for website features and functionality. Not surprisingly, all websites provide the ability to apply online, yet 30% do not display a privacy policy. While the vast majority are easy to navigate and are engaging (e.g., graphics, multimedia, interactive content), a smaller percentage provides FAQs or online help/chat. Given the high level of interest in these programs among international students, it is surprising that so few provide the ability to translate website content into multiple languages.

2.2 Engagement

As a STEM-designated program, online MS programs in business analytics may benefit from adapting strategies used in other STEM-designated programs in order to increase student engagement with content in the asynchronous online environment. Evidence suggests that commonly used approaches that foster student-to-student interaction, such as discussion forums, are less effective for learning quantitative/technical subjects online than faculty guided student interaction (Sebastianelli and Tamimi, 2011).

An approach that has been particularly prevalent in STEM related courses, and one that offers viable instructional design ideas for online self-directed individual engagement with business analytics content, is inquiry-based learning (IBL) (Abd-El-Kahlick et al., 2004). IBL is exploratory by nature and has been effectively implemented in asynchronous online environments via POEE (predict, observe, explain, evaluate) pedagogical design (Al Mamun et al., 2020). This is an ideal framework within which faculty teaching online business analytics courses can create guided interactive content (via interactive multimedia) that provides high quality student engagement with all three subject area domains.

Table 4. Website Features and Functionality

Specific Feature / Functionality	Top 30 (% Yes)	Top 10 (% Yes)
FAQ?	67 %	100 %
Ability to Translate?	3 %	10 %
Online Help or Chat?	53 %	80 %
Privacy Policy?	70 %	70 %
Online Application?	100 %	100 %
Easy to Navigate?	77 %	90 %
Engaging?	70 %	80 %

3. CONCLUSION

Given the proliferation of online Master of Science (MS) programs in business analytics, it is important to understand what constitutes best practices, not only in terms of designing curriculum to meet (or anticipate) industry needs, but also in terms of how to increase the probability for student success in an asynchronous online learning environment. Toward this end, we benchmark the top ranked online MS programs in the US. We also recommend borrowing strategies from other STEM-designated disciplines to enhance student engagement with online business analytics content.

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