# Determining The Drivers Of Student Performance In Online Business Courses

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**ABSTRACT**

*An emerging question in business education is whether all students would benefit from distance learning and if student performance can be predicted prior to enrollment in an online course based on student characteristics. In this paper, the role of student characteristics on academic performance is examined in the context two different online courses. Empirical test of a self-assessment tool on 272 students across 9 course sections, using a logistic regression framework demonstrates that end-of-semester student grades can be predicted by students' own self-reports of their learning preferences at the onset of the course. However systematic differences are found between the two courses in terms of the drivers of student performance, demonstrating the importance of a customized approach to the predictive framework presented.*

**Keywords:** Distance Education; Learning Preferences; Learning Outcomes

## INTRODUCTION

The use of distance learning methods in business education has witnessed a significant growth over the past decade. It is estimated that each year over 6 million students -- accounting for nearly one third of the higher education student population -- take online courses in the United States (Allen & Seaman, 2011; Popvich & Neel, 2005). With approximately one third of all business schools offering distance learning options to their students, business schools are among the leading providers of distance education, either by integrating them as part of their curriculum or by offering degree-granting programs. Over the past decade, the use of distance learning methods has witnessed a steady rise and the number of business students taking online classes has experienced a predictable path of growth. As a result, distance learning methods are no longer restricted to a finite set of niche-oriented business schools. Distance learning methods are now integrated into the curriculum of many well-recognized business schools and have become an acceptable way of delivering quality education.

The growing use of distance learning methods has not been without costs. In addition to the financial burdens to business schools for implementing distance education offerings, there are human costs associated with reduced learning outcomes experienced by segments of the student population for whom distance learning is not the most effective mode of education. While the growing use of distance education has expanded the reach of many business schools, it has also exposed a wide range of the student population to this pedagogical approach. It is therefore important to ensure that all business students who enroll in online classes are able to benefit from them.

Understanding what factors contribute to or hinder performance in an online course would help those students for whom online learning is not the best fit to seek traditional modes of learning, or to recognize the challenges they may need to overcome should they decide to remain enrolled in the course. This understanding would also enable business schools to allocate the finite and often restricted capacity of their online course offerings to those students who are most likely to benefit from them. The goal of this paper is to address the above objectives by examining how student characteristics can be used to predict student performance in online courses. A self-assessment method is used whereby students' own expressions of their learning preferences and demographic backgrounds, prior to course delivery are linked to their eventual end-of-semester course grades. Empirical test of this framework, utilizing data from 272 students in 9 course sections in 2 different business courses demonstrates that specific student predispositions towards online learning can significantly affect their grades. Furthermore, these effects are found to be different between the two courses, highlighting the need to adapt this approach to each

course, enabling the instructor and the student to project course performance at the start of the term, and if needed to take corrective actions to optimize the path to learning.

**Transformation of the Learning Environment**

Distance education and online learning are largely interchangeable concepts which have experienced significant growth over the past decade. Despite this seemingly recent growth, distance education methods have been in use by educational institutions for nearly two centuries. The earliest documented cases of distance education date back to correspondence programs of the early 1800s offered in several European countries, covering courses in short-hand writing and composition (Edelson & Pittman, 2008). A primary outcome of distance education over the past two centuries has been the expansion of institutions' reach to demographic and geographic ranges of students beyond what is possible through traditional face-to-face teaching.

Ever since the inception of early forms of distance education, there have been documented cases of concerns by educators over students' ability to engage in education from a distance (Galloway, 1913; Nation's Business, 1926; Swiggett, 1915). These concerns were further heightened by the transition of the learning environment away from face-to-face settings as a result of the deployment of electronic technologies in the 1940s and 1950s and digital transmission of course content via the Internet over the past two decades (Rovai, Ponton & Baker, 2008). Concerns over student ability to engage in learning from a distance continue to be expressed today (e.g., Simonson, Smaldino, Albright & Zvacek, 2009; Wagner & Hugan, 2011), as the abandoning of traditional pedagogical approaches and lack of regular face-to-face contact with the teacher are considered by many as possible challenges to student learning.

Since the early 1990s the reach of distance learning programs has significantly increased due to the wide household adoption of the Internet (Allen & Seaman, 2011; Curran, 2008). The resulting learning environment enables timely, text-based communication between instructors and students, and increases in bandwidth capacity are now providing further enhancements to the learning environment by enabling new forms of communication to materialize. These include web-based meetings environments, podcasts, video-streaming and related multimedia platforms (Buhagiar & Potter, 2010). As a result the students' distance learning environment has changed rapidly and it is crucial for educators to understand the drivers of student learning in this fast evolving setting.

**Research on Distance Business Education**

Considerable research has focused on examining the learning outcomes of distance business education as a function of the mode of teaching. This research stream, for the most part, has found that on average the degree of student learning in distance settings is equivalent to face-to-face settings. For example, Saneaton and Kogh (1999), examining the test scores of students in Information Technology courses found no statistically significant differences between online and face-to-face courses. Similar results were observed by Leasure, Davis and Thievon (2000), Hay, Hodgkinson, Peltier and Drago (2004), and Sweeney and Ingram (2001). In the context of a Business Statistics course, Grandzol (2004) also found that the quality of teaching was equivalent between distance and face-to-face classes. Similar results were observed by Friday et al. (2006) in the context of Organizational Management courses, and by Priluck (2004) in the context of marketing courses, whereby no statistically significant differences in performance scores were noted between online and face-to-face offerings.

Research has shown that specific characteristics of the instructor and the course can contribute to students' satisfaction and their perceptions of learning in distance learning environments. For example, in the context of MBA programs, Hay, Hodgkinson, Peltier and Drago (2004) found that both student satisfaction and student-instructor interaction levels can be enhanced by utilizing distance learning methods, when compared to traditional face-to-face classes. This is because the distance learning medium enables students to reach out to the instructor more easily, outside the confines of classroom walls and beyond the standard time restrictions of class hours. Oblender (2002) found that dropout rates were considerably lower in online courses compared to face-to-face classes due to the increased time and logistical flexibility associated with the online learning environments. Part-time students, those with heavy family and professional obligations who may opt out of attending face-to-face classes are able to continue pursuing their educational goals by enrolling in distance courses where considerably higher degrees of geographic and time flexibility exist.

Research has also identified the underlying characteristics of online business courses which contribute to learning outcomes. For example, in the context of marketing courses, Peltier, Drago and Schibrowsky (2003) examined course characteristics that influence students' perceptions of learning. Their study helped identify specific course characteristics that distance educators must manage in order to ensure positive learning outcomes. Research suggests that certain demographic variables can also affect the degree by which students benefit from online courses. For example, it has been found that online course performance is not affected by student age (Dutton, Dutton & Perry, 2002; Gerlich, Mills & Sollosy, 2009) and gender (Daymont & Blau, 2008; Dutton, Dutton & Perry, 2002; Friday, Friday-Stroud, Green & Hill, 2006), but is enhanced by an improved educational foundation (Artino, 2007; Gerlich, Mills & Sollosy, 2009). The existence of these variations highlights the need for the development of a better understanding of the drivers of student performance in distance learning settings for business students.

While research has begun to uncover the effects that course format and delivery mode may have on learning outcomes in business courses, relatively little research has helped identify the student characteristics that enhance or inhibit business students' learning outcomes in distance courses. How a student approaches the distance learning process can be critical to the quality of outcomes experienced and the amount of learning that is achieved (Gaytan & McEwen, 2007). Understanding this relationship would enable business schools to discourage students with learning approaches that do not match the demands of online courses, from taking such courses. This understanding would also provide an advanced indicator to such students of the challenges they may need to overcome in order to perform well in an online class, and may persuade some to seek traditional face-to-face forms of instruction instead.

**Predicting Student Performance in Online Courses**

The demands of distance education on students are considerably different from the demands of face-to-face instruction. Distance learning requires students to be self-driven and less reliant on others in advancing their coursework (DeTure, 2004; Wadsworth, Husman, Duggan & Pennington, 2007). Successful students in distance learning contexts have the ability to study assigned material and to absorb the communicated information on their own. This is a sharp contrast to courses in face-to-face formats where the constant engagement of the instructor with the students can inspire and drive student learning. Distance learning environments typically lack face-to-face interactions and require students to be effective communicators in a web-based learning environment and to be self-driven in their learning approach (Rovai, Ponton & Baker, 2008).

Furthermore, from an information processing perspective, while face-to-face instruction requires students to be active viewers, listeners and participants within the confines of classroom walls, online courses often require knowledge acquisition to take place through self-administered media such as digitized or print materials, multimedia streaming and the use of discussion boards (Edirisingha, 2008; Rovai, Ponton & Baker, 2008). The reinforcing effects of face-to-face class discussions are therefore absent in online settings and are often relegated to chat room style non-synchronous online discussion boards. The ability of a student to engage and interact in this new instructional environment may therefore significantly affect his/her ability to absorb class instruction. Knowledge of the degree of fit between a student's learning preferences and the demands of the online learning environment is critical to achieving high performance levels and desired learning outcomes. Below are some of the factors that influence this relationship and can be used as predictors of student performance:

*Self Discipline*

Research suggests that students who set their own goals, and are able to regulate their use of time efficiently perform better in self-guided educational environments, such as those provided in distance courses (Al-Harthi, 2010; Deture, 2004; Hodges, 2008; Jackson, 2002). The positive impact of self-discipline on performance has been noted by researchers in a variety of fields, including sports (Cockerill, Pyle & Read, 1996), personal development (Gundlach, Martinko & Douglas, 2003) and career planning (Staples, Hulland & Higgins, 1999). In the absence of regular class meetings typical of traditional face-to-face classes, self-disciplined students who are able to maintain their own pace with the advancement of an online course's content are likely to benefit more from the course than those students who lack such discipline.

*Self-Efficacy in Learning*

A student's natural abilities and experience level in self-instruction can significantly enhance the learning experience in distance education settings. Individuals are known to be different in how well they can absorb new knowledge on their own (Lefrancois, 2011). While some individuals rely on the instruction, lecturing, and guidance of tutors, instructors, and coaches, others thrive in independent learning environments. In an online course setting where distance between the instructor and the student exists, both in terms of geography and time, self-efficacy in learning is critical to student success.

*Need for Interactivity*

Students vary in the degree to which they rely on social interactions in their learning process. In-class interactivity has been shown to increase student alertness, create cognitive engagement and trigger a social process of learning (Simonson, Smaldino, Albright & Zvacek, 2009). However, while some students enjoy the interactions that exist among students and faculty in a class setting and learn though such interactions, other students may be less engaged and less interactive in such settings (Ueltschy, 2001). Students who find their learning to be dependent on in-class interactions are likely to benefit more from traditional face-to-face instruction rather than distance education settings.

*Language Skills*

Students who are weak in the language of instruction used in a course or are deficient in their reading and writing skills may find their ability to study the required material challenged in an online environment (Al-Harthi, 2010; Jackendoff, 1994; Wagner & Hugan, 2011). Since the contents of online courses are often communicated using written material, students with poor language skills may be at a disadvantage compared to students who are well-versed in the language of instruction used in an online course. Poor language skills not only slow down the learning process but they also limit a student's ability to effectively respond to assessment tasks. Language skills increase the speed by which students can study assigned material, improve the amount of learning that takes place, and help increase test scores during assessment, thereby positively influencing learning outcomes and student performance scores.

*Intrinsic Goal Setting*

Research in human motivation has shown that individuals who challenge themselves and do not shy away from difficult tasks often perform better than those who avoid such challenges (Fisher & Ford, 1998; Maslow, 1998). This has been shown to be the case for individuals (and social groups) in a variety of contexts ranging from professional sports, politics and warfare (Deci & Flaste, 1996). Organizational behavior research indicates that intrinsic goals -- those set by the individual -- can orient the individual to achieve those goals at higher performance levels than if the goals were set by others as extrinsic goals (Deci & Flaste, 1996; Maslow, 1998; Thoms, 2009). The embracement of a challenge not only affects the amount of energy exerted but also has subconscious effects on tactical steps taken to achieve success. In a distance learning setting, a student' s degree of intrinsic goal-setting can have positive effects on learning outcomes. Aiming for specific goals such as performance scores and meeting assignment submission deadlines affects a student's ability to effectively engage with the class content. In contrast, an undisciplined approach can lead to procrastination, missed deadlines, and reduced learning, thereby translating to lower course performance outcomes for the student. It is therefore expected that students with an intrinsic approach to goal setting will perform better in online courses than those who are not intrinsic goal-setters.

*Academic Foundation*

When examining student performance and the learning outcomes in any educational context -- online or face-to-face -- it is expected that the student's inherent learning abilities would contribute to learning outcomes. Research has shown that there is a halo effect in learning whereby a strong educational foundation can lead to better future learning outcomes (Artino, 2007; Gerlich, Mills & Sollosy, 2009). Therefore, students with superior academic skills at the onset of a course are likely to benefit more from the educational content provided than those

students who lack the necessary foundations. This halo effect may become more pronounced in online settings where limited access to in-person resources for addressing base knowledge deficiencies exist. It is therefore expected that students with superior academic backgrounds would continue to outperform the rest of the students in an online course setting.

While some of the student characteristics discussed above are expected to influence learning outcomes, the degree by which they exert such influence is unknown. In the next section an empirical test of the predictive strength of the above relationships in determining student performance will be conducted. The effects of the above factors as well as additional student characteristics will be explored and contrasted between two online business courses.

## METHODOLOGY

### Data Collection

In order to measure the effects of learning preferences and student characteristics on course performance, a questionnaire consisting of several multi-item scales was developed. Measures of self-discipline, need for interactivity, intrinsic goal setting, academic self-efficacy and language skills were obtained. In addition, to quantify the learning outcome for each student, end-of-semester course grades were tabulated. This enabled an empirical examination of the link between various student characteristics and learning outcomes as measured by the letter grade issued to the student. The data were collected from 272 students enrolled in nine different course sections of two marketing courses. Four (4) of these sections consisted of students in Marketing Research and the remaining 5 were sections in the Marketing of Financial Services course. All sections were offered at a university located in Northeastern United States and were taught by the same instructor.

The questions in the questionnaire and the data collection procedures were adopted from previous research studies (Daymount & Blau, 2008; DeTure, 2004; Fisher & Ford, 1998; Gerlich, Mills & Sollosy, 2009; Wagner & Hugan, 2009) and are listed in Appendix A. The wording of the questions was prescreened through a peer review process engaging two online instructors and modified to fit the specific context of the online courses being examined. In addition to the questionnaire items described above, several demographic questions were asked. These included the student's age, undergraduate grade point average (GPA), number of children living at home, student status and number of years of work experience. To further refine question wording and questionnaire flow, a pre-test with 17 MBA students was conducted. The pre-test helped improve the clarity of specific questions.

Of the 272 collected responses, 132 were from the Marketing Research course sections and 140 from the Marketing of Financial Services course sections. Consistent with earlier research (Daymount & Blau, 2008; DeTure, 2004; Fisher & Ford, 1998; Gerlich, Mills & Sollosy, 2009; Wagner & Hugan, 2009), learning outcomes were measured by examining student performance. In this analysis the letter grade of the student at the end of the course was used as the performance measure. The average age of the students was 29.4, average GMAT entrance score was 600, average undergraduate GPA 3.32 (out of 4), and the average number of years of full-time work experience was 6.56. Sixty eight percent (68%) of the sample worked full-time, 17% had children living at home, and 56% were male. The above figures closely resemble the underlying characteristics of the student population at the institution where the data were collected.

### Data Analysis

In order to explore the drivers of student performance, the set of learning preference questions asked from the students were subjected to factor analysis. Five (5) factors were retained through this process, based on the eigenvalues of 1 or higher, accounting for 81% of variations in responses on the various questions. The factor pattern with an orthogonal rotation was then used to interpret the dimensions of students' responses. The rotated factor loadings are shown in Table 1. As can be seen from the table each of the variables load on specific factors related to the underlying student learning characteristics discussed earlier.

The variables that load high on Factor 1 relate to students' lack of motivation and drive and will therefore be referred to as 'lack of intrinsic goals.' Factor 2 relates to students' comfort and experience level with the English language and is therefore labeled 'language skills.' Factor 3 relates to measures of self-discipline such as meeting deadlines and as such this factor is labeled 'self-discipline.' Variables loading high on Factor 4 relate to students' ability to learn on their own and this factor is therefore labeled 'academic self-efficacy.' Factor 5 relates to students' need for classroom interaction. The variables that load on this factor address students' need for classroom discussions and interactivity and this factor will therefore be referred to as 'need for face-to-face interactivity' in the balance of the paper.

For each student, factor scores for the five factors outlined in Table 1 were produced. The factor scores alongside the demographic characteristics were then used as predictors of course performance. Binary logistic regression was used, whereby the factor scores and demographic measures were used as predictors and the dependent variable was whether or not the student received a grade of A in the course. Two separate logistic regression analyses were conducted, one for the students in the Marketing Research course and one for the students in the Marketing of Financial Services course. This enables the examination of variations in the predictive relationships being examined, and contrasting the drivers of course performance between the two courses. This analysis is shown in Table 2.

**Table 1: Factor Structure of Self-Reported Measures**

| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|---|---|---|---|---|---|
| I am good at balancing multiple responsibilities under time pressure. | -0.19677 | 0.44451 | 0.14598 | 0.45904 | -0.02642 |
| I like others to set deadlines for me. | 0.13473 | 0.00225 | -0.29068 | -0.37492 | -0.13875 |
| I am a self-disciplined person. | -0.15985 | 0.39971 | 0.55686 | 0.36713 | 0.01919 |
| I often delay working on assignments until the last minute. | 0.09978 | -0.04949 | -0.87297 | 0.04542 | 0.13521 |
| I often complete projects ahead of time. | 0.03101 | -0.00052 | 0.85712 | 0.09537 | -0.06147 |
| Classroom discussions with other students are critical to my learning. | 0.02036 | 0.04086 | -0.04617 | -0.13828 | 0.83598 |
| Lively classroom discussions are essential to my learning experience. | 0.01354 | 0.03170 | -0.09596 | -0.10583 | 0.85054 |
| I choose courses based on how easy the professor is known to be. | 0.82340 | 0.07356 | -0.05326 | -0.11999 | -0.06689 |
| I prefer taking classes that are easy. | 0.81073 | 0.04300 | -0.05324 | -0.10779 | -0.06740 |
| I believe online classes are supposed to be easy. | 0.66169 | -0.22888 | -0.04488 | 0.02766 | 0.28028 |
| I learn well on my own. | -0.09303 | 0.12955 | -0.01412 | 0.72764 | -0.33399 |
| I can easily learn new things just by reading. | 0.02036 | -0.11882 | -0.00665 | 0.79519 | -0.13324 |
| English is my first language. | -0.00113 | 0.83636 | -0.00032 | -0.08257 | -0.03754 |
| Most of my undergraduate courses were taught in English. | 0.04476 | 0.83972 | 0.02984 | 0.05183 | 0.10290 |

Note: A factor loading of 0.6 or higher was used to interpret the factors.

**Table 2: Logistic Regression Analysis Results for Course Performance**

| | Marketing Research | Marketing Financial Services |
|---|---|---|
| Intercept | -6.6210<br>(4.7419) | -2.6017<br>(4.6620) |
| Lack of intrinsic goals | 0.2748<br>(0.2303) | 0.2670<br>(0.2265) |
| Language skills † | 0.8232 ***<br>(0.2993) | 0.1124<br>(0.2556) |
| Self-discipline | 0.5230 **<br>(0.2494) | 0.5091 **<br>(0.2420) |
| Academic self-efficacy | 0.4588 *<br>(0.2563) | -0.1028<br>(0.2327) |
| Need for face-to-face interactivity † | -0.0597<br>(0.2209) | -0.4931 **<br>(0.2417) |
| Number of years of full-time work experience | -0.0641<br>(0.1180) | 0.0481<br>(0.1198) |
| Full-time student status (yes = 1, no = 0) † | 0.2385**<br>(0.1148) | 0.1484<br>(0.1118) |
| Age | 0.0873<br>(0.0942) | -0.1445<br>(0.0956) |
| Number of hours of work/volunteering per week | -0.0152<br>(0.0190) | 0.00860<br>(0.0156) |
| Gender (male = 1, female = 0) | -0.4156<br>(0.4899) | 0.8661<br>(0.5704) |
| GMAT score upon entry to the MBA program | -0.00202<br>(0.00410) | 0.00402<br>(0.00466) |
| Undergraduate Grade Point Average (GPA) † | 1.6614 ***<br>(0.7057) | 0.4508<br>(0.6375) |

* indicates $p < 0.1$; ** indicates $p < 0.05$; *** indicates $p < 0.01$. † indicates that the parameter estimates are different between the two courses, at the $p < .05$ level. Note: Top numbers are coefficient estimates, and numbers in parentheses are standard errors of estimates

Both logistic regression results are statistically significant. The logistic regression for the Marketing Research course is significant at the $p < 0.03$ level (AIC = 160.2) and for the Marketing of Financial Services course at the $p < 0.02$ level (AIC = 149.7). As can be seen from Table 2, for the Marketing Research course, language skills, self discipline, academic self-efficacy, full-time student status, and undergraduate GPA influence student performance. Self-discipline has a positive effect on course performance ($p < .05$) as does academic self-efficacy ($p < .1$). As discussed earlier, these student characteristics are expected to help students navigate the challenges of the isolated environment of online courses.

In addition what students bring to the Marketing Research course in terms of their backgrounds can affect their course grades. This is evident by the positive effects found for language skills and for undergraduate GPA, both of which are highly significant ($p < .01$). This result concurs with discussions presented earlier regarding the positive effects of a stronger academic foundation on student ability to benefit from course content, and is also consistent with earlier research finding (e.g., Artino, 2007; Gerlich, Mills & Sollosy, 2009). Language skills are especially relevant in this course as many of the student projects involving qualitative marketing research and questionnaire design require firm grasp of the English language. Furthermore, for the Marketing Research course full-time student status has a positive effect on course performance ($p < .05$). This suggests that full-time students who may be able to dedicate more time and effort to the course projects in this course are likely to perform better. Given the highly demanding nature of the Marketing Research course this is an expected result.

Of the five factors extracted through the factor analysis, two (lack of intrinsic goals and need for face-to-face interactivity) show no effects on student performance in the Marketing Research course ($p > .1$). In addition, age, gender and GMAT scores were found to have no effect on student performance in the Marketing Research course. Interestingly, these factors also do not have significant effects in driving student performance in the Marketing of Financial Services course. This finding is consistent with earlier studies that suggest, that online course performance is unaffected by student age and gender (Daymont & Blau, 2008; Dutton, Dutton & Perry, 2002; Friday, Friday-Stroud, Green & Hill, 2006; Gerlich, Mills & Sollosy, 2009).

Furthermore, the drivers of course grades can be contrasted between the Marketing of Financial Services course and the Marketing Research course. For example, while self-discipline has similar effects on course performance in both courses, the need for face-to-face interactivity can be a determent in the Marketing of Financial Services course. This suggests that students who value in-class face-to-face instruction may find the online instructional environment less conducive to their learning in this course. In addition, language skills which are of great significance in the Marketing Research course -- due to tasks related to qualitative data collection and questionnaire design projects -- do not have as great an impact in the Marketing of Financial Services course. This suggests that students who may lack English language skills -- most likely international students -- will not be at a disadvantage in the Marketing of Financial Services course, whereas their performance may suffer in the Marketing Research course due to lack of language skills. In addition, when contrasting the two courses, for the Marketing of Financial Services course, the effects of full-time student status and undergraduate GPA dissipate.

The specific contrasts outlined above between the two courses are all significant at the $p < .05$ level and highlight the fact that the drivers of student performance in a course can be different from one course to the next. This observation highlights the need to calibrate the predictive framework independently for each course (and possibly even for each instructor) in order to gain an accurate understanding of what factors contribute to student performance, and which factors hinder it. Knowledge of this relationship can guide both the faculty and the students to recognize the learning opportunities and challenges that may lay ahead in a given course, and to appreciate that these relationships will not be identical -- both in terms of magnitude and directionality -- across different course offerings.

**A Framework for Predicting Student Performance**

The results presented in this paper indicate that students' self-reported measures of their learning preferences and their demographics characteristics can serve as good predictors of their performance in online marketing courses. This is an important finding on many grounds. For the individual student, advanced knowledge of the degree by which his learning habits may inhibit or facilitate learning in a given course can serve as a decision criterion in deciding on which courses to register for. To the educational institution, advanced knowledge of a student's ability to succeed in an online learning environment would enable optimal allocation of students to distance versus face-to-face classes, to maximize learning outcomes while reducing the pressures of student load on constrained enrollment capacity often associated with distance learning course offerings. To the online instructor, advanced knowledge of the online learning capabilities of her students would help her in making adjustments in the delivery of the course to enhance student learning outcomes. For example, if an instructor recognizes that a large proportion of her online class is in need of increased interactivity, the format of the course can be modified from a pure online format to a hybrid form of delivery whereby some combination of distance delivery and web-based live class meetings is used.

As outlined in Figure 1, and as demonstrated empirically in this paper, the process of identifying sources of student performance can be pursued by each individual instructor. In this process a sample of data on students who have already completed the course would be used. The utilized data would include students' self-reports of their learning habits and their grades at the end of the course. Instructors can choose to utilize some of the questionnaire items used in this paper, or to expand or replace them as they see fit, to match the nature of their teaching methods.

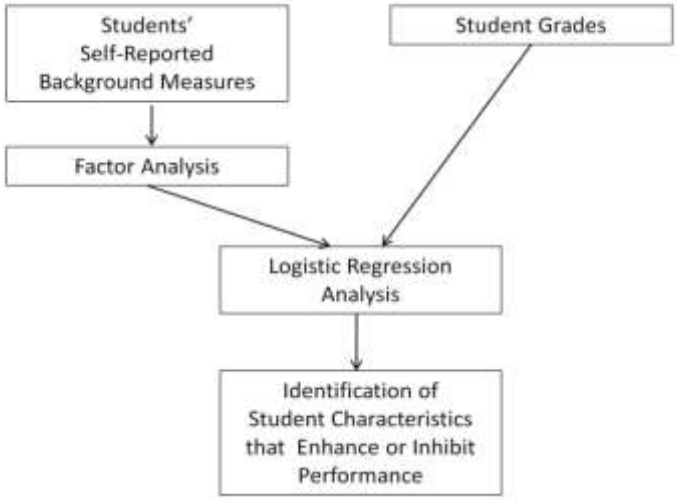


**Figure 1: Process of Predicting End-of-Semester Grades Based on Self-Reported Measures**

These measures would then be used to develop a factor structure which characterizes the underlying aspects of students' learning approaches and other student characteristics. The factor scores emerging from this analysis alongside the student background data can be used in a predictive modeling framework to develop an understanding of the drivers of learning outcomes. The information obtained from this analysis can then be communicated to new students on what characteristics are needed to achieve high performance levels in a given course. If an incoming student recognizes that a particular online course is demanding certain aspects of learning that are weak in him, the student can then anticipate some difficulty in completing the course requirements and may need to consider other online instructors or other course delivery formats.

Therefore, the formal measurement of students' learning characteristics through surveys administered during pre-registration periods can be used as a predictive input by business schools, online instructors, and students to optimize learning outcomes. Even in cases where due to time or resource constraints, no formal questionnaires can be administered to every student, making students aware of what general student characteristics contribute to or inhibit academic performance in a given online class can be highly informative to them. Clearly, the earlier this information is revealed to the student, the more quickly corrective measures such as changing course sections or switching to traditional modes of learning could take place. It is therefore important that this approach be used during the pre-registration period or the first few weeks of class to provide students the time necessary for adjusting their course schedules.

## FUTURE RESEARCH

Research on the drivers of business students' performance in distance learning contexts can be expanded in many different directions. One of the most significant questions in this area is regarding the existence of student segments based on their studying habits. In other words, is it possible to group online business students into different groups with common approaches to learning? Answering this question could help instructors better address the varying needs of their online students, and it may also help business schools develop segment-based approaches to their online course offerings, within and beyond marketing. Additional research can focus on the impact of students' lifestyle and psychographic measures in the learning process. While the measures used in this paper focused purely on students' learning characteristics, other psychological measures and academic aptitude scores may improve the predictive ability of the proposed framework. In addition, the role of students' past experiences with distance learning environments, as for example measured by the number of online courses taken in the past, could help improve our understanding of student performance and shed new light on the evolutionary process students may undergo as they become more exposed to distance education options.

Future research can also expand this work in the context of various business courses. For example, one could examine the links between performance, student demographics and learning preferences in other courses which are integral to business education. Variations may be expected to exist on various points on the qualitative-to-quantitative spectrum, whereby some courses could be better candidates for such a predictive framework. In addition, contrasting the drivers of course performance in online versus face-to-face classes can help business faculty gain a better understanding of how to optimize learning outcomes as schools gradually transition to the distance learning platform. Furthermore, while the focus of this study was MBA students, examining how drivers of student performance may vary between undergraduate and graduate business courses may be a fruitful line of inquiry for future research. Research can also examine the role of the instructor's teaching style in influencing the students' learning habits, and the possible interactions that may exist between these two constructs in driving learning outcomes. For example, some instructors may be highly demanding in terms of the number of deliverables and assignment deadlines, thereby increasing the influence of student self-discipline on performance scores. For an instructor, knowing what aspects of her students' approach to learning match her online teaching approach, could help her focus on those elements of teaching that are most beneficial to the students.

## CONCLUSION

In this paper we have demonstrated that self-reported measures provided by business students at the onset of the course regarding their online learning preferences can be used as predictors of their course performance upon completion of the course. Knowledge of this predictive relationship can aid the student make corrective measures or seek other modes of learning, if needed. This knowledge can help a distance educator adjust her teaching methods during a given semester or gradually over an extended period of time, and can also aid business schools in navigating their student enrollments toward course offerings that best match their students' individual backgrounds and learning preferences. While such a navigational task may be an administrative challenge, if deployed during the pre-registration period or early days of the semester, it would enable students to seek course offerings that are optimal matches for them and enhance their educational experience. By doing so, learning outcomes in many institutions can be improved, and it is therefore hoped that the framework presented in this paper inspires distance educators in business schools to apply a similar approach to helping their students reach higher levels of academic performance.

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## APPENDIX:

### Survey Questions

| **Learning Preferences: *** |
|---|
| I am good at balancing multiple responsibilities under time pressure. |
| I like others to set deadlines for me. |
| I am a self-disciplined person. |
| I often delay working on assignments until the last minute. |
| I often complete projects ahead of time. |
| Classroom discussions with other students are critical to my learning. |
| Lively classroom discussions are essential to my learning experience. |
| I choose courses based on how easy the professor is known to be. |
| I prefer taking classes that are easy. |
| I believe online classes are supposed to be easy. |
| I learn well on my own. |
| I can easily learn new things just by reading. |
| English is my first language. |
| Most of my undergraduate courses were taught in English. |
| **Demographics:** |
| In what age bracket are you?<br>[18-24], [25-29], [30-34], [35-39], [40-44], [45-49], [50-54], [55-59], [60+] |
| During this semester, approximately how many hours a week will you be dedicating to your place of employment, internship or volunteer work?<br>[1-10], [11-20], [21-40], [41-60], [60+] |
| In which bracket was your undergraduate GPA?<br>[less than 2.0], [2.0-2.4], [2.5-2.9], [3.0-3.4], [3.5-3.7], [3.7-4.0] |
| What was your highest GMAT score when applying to the MBA program in which you are currently enrolled?<br>[less than 500], [500-599], [600-649], [650-699], [700 or higher] |
| What is your gender?<br>[Female] , [Male] |
| Current student status:<br>[Part-time student], [Full-time student] |

* Responses were captured using a 5-point Likert scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (5)

**NOTES**