E-CONSCIENTIOUSNESS AND E-PERFORMANCE IN ONLINE UNDERGRADUATE MANAGEMENT EDUCATION

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Abstract

In empirical studies of the five major factors of personality, Conscientiousness is one of the few traits consistently correlated with organizational performance [1]. A question for management educators, then, is whether Conscientiousness is also highly correlated with educational performance. In this study, we test this correlation in the online management education classroom where we have access to straightforward behavioral (rather than self-reported) measures of both conscientiousness and classroom performance. The tracking technology of the online classroom allows us to collect real-time data about student conscientious behavior to compare with actual student performance over the time-period of one semester. By testing the model of conscientiousness as a predictor of course performance in the e-classroom we contribute to the literatures linking personality traits with performance, suggest ways to move beyond self-report for personality studies, as well as suggest ways in which the online classroom may be mined for behavioral data in organizational studies.

Keywords: online education, e-learning, conscientiousness, personality, performance.

1   INTRODUCTION

The online learning environment in higher education is, at the very least, a rich textual space, ripe with research opportunities. While there have been myriad studies of comparative learning in online and onsite education (see for example, Johnson, Aragon, Shaik, and Palma-Rivas [2], Maki, Maki, Patterson, and Whittaker [3], and Swan [4]), as well as studies predicting success in online educational environments (see for example, Aragon, Johnson, and Shaik [5], Santo [6], and Wojciechowski & Palmer [7]), there have been fewer studies that mine the collected data represented by the archived online classroom to advance knowledge in both education and performance management. This exploratory work attempts to do just that. Exploiting the unique attributes of the online classroom—the ability to track student "views" of course material, and "hits" to the classroom—this study is able to suggest potential answers to questions about student conscientiousness in the online environment (e-conscientiousness) and performance in the online class (e-performance). In particular, this study eschews self-reports about conscientiousness in exchange for more truly direct measures of personality-driven behavior. To accomplish this, we first briefly review the psychological/pedagogical literature on the conscientiousness personality trait as a correlate to performance in both organizational and educational settings. We next briefly review the literature on using personality and other learner characteristics to predict performance in the online classroom. Noting some of the lacunae of these literatures, we next propose hypotheses using direct measures of conscientiousness to predict performance in the online classroom. Using preliminary data from both wholly online and hybrid (online plus onsite delivery—sometimes called "blended") management education classes, we begin testing these hypotheses to better understand conscientiousness in the online classroom environment and suggest how it may be related to course performance. Finally, we place our findings in the context of the reviewed literatures on learner characteristics and performance in e-learning.

1.1   A brief history of conscientiousness and performance

In the late 1950s, early 1960s, trying to predict officer effectiveness in the U.S. military, researchers Tupes and Christal [8] were confounded by the lack of consensus in the psychological research field of peer ratings of specific personality traits. Using their own sample of Air Force Officer Candidate

School subjects who rated each other, they were able to isolate five personality factors that differed only slightly from analysis to analysis. From this study, an entire field based on the "Big Five" personality traits was born, although credit is often given to Digman [9] who rescued Tupes and Christal from the obscurity of a USAF ASD technical report. Given the original study's preoccupation with officer effectiveness, much of the subsequent literature, especially in management science and educational studies, focused on which of the five personality traits (extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience) was most correlated with performance in organizational or educational settings.

In a 1991 meta-analysis of the Big Five Personality traits and organizational performance, Barrick & Mount [1], specifically note that the conscientiousness dimension was related to a variety of educational achievement measures. Starting with the evidence that in educational settings, scores on conscientiousness and educational achievement are consistently correlated (see, for example, Digman & Takemoto-Chock [10] and Smith [11]), Barrick and Mount [1] postulated that conscientiousness would be related to job performance, as well, because it assessed the personal characteristics of persistence, planning, care, responsibility, and hardwork. Indeed, Barrick & Mount [1] found that conscientiousness was the most predictive personality dimension in their meta-analysis, although they do caution that the overall validity of personality measures has been found to be relatively low. This concern was corroborated in 2000 by Hurtz and Donovan [12]. It is this caution that provides the impetus for the present study. Barrick & Mount [1] note the common-sensical reasoning that conscientiousness traits such as planful, persistent, achievement oriented, etc. would contribute to job success, yet they question the low validity of the measure. They do not, however, entertain the notion that low validity of self-reports of behavior—the method by which researchers ascertain levels of conscientiousness through now standardized testing instruments—may be behind the low validity of the construct. Indeed, all of the research on conscientiousness that was reviewed for this present study relied on the NEO Five Factor Inventory, or other related inventories, to measure conscientiousness. In the psychology, education, and management fields, then, conscientiousness is almost universally measured via a survey instrument that includes self-reporting on items such as: "I am always prepared," "I pay attention to details," "I shirk my duties (reverse scored), etc. It may also be common-sensical to note that "gaming" this survey to please an employer or educator would be pretty easy (Christiansen, Goffin, Johnston, & Rothstein [13] and Ellingson, Sackett, & Hough [14]).

The noted low validity of the conscientiousness construct in the literature suggests that the time might be right to explore alternative measures of this factor, especially given its contested importance in predicting both educational and management performance. For this reason, we propose a more directly behavioral measure of conscientiousness to predict performance in management education (combining both the education and management fields where much prior research has taken place). We argue that the online classroom affords us a terrific new opportunity to directly observe conscientiousness, rather than relying on self reports on administered inventories. Before we turn to these explorations in construct building, though, we need to review what the literature reveals about performance in the online environment, writ large.

1.2   Learner characteristic predictors of performance online (e-performance)

Taking at face value the literature that posits "no differences" in learning outcomes between online and face-to-face (onsite) classrooms (Johnson, Aragon, Shaik, and Palma-Rivas [2], Maki, Maki, Patterson, and Whittaker [3], and Swan [4]), we next look to the literature that attempts to predict success in the online education environment.

A relatively early entry into this field was the 2001 Santo [6] dissertation on "Virtual Learning, Personality and Learning Styles." Using the NEO FFI to measure conscientiousness, Santo confirmed earlier research in the traditional classroom that suggested that for business students, especially, conscientiousness was related to positive course outcomes. In 2002, Aragon, Johnson and Shaik [5] picked up on the question of the predictive value of learning styles, analyzing three different learning style instruments, but did not follow-up with personality variables to predict online classroom success. Concerned foremost, with the higher rate of student drop-out in online classes, Wojciechowski & Palmer [7], looked to predict success in online business classes (using student grades) with student learner characteristics. Using 13 different characteristics, based largely on the availability of data, they found the strongest connection to grade point average as compared to, for instance, demographic

variables and previous experience with online classes. Although they did not specifically test personality characteristics, we may suggest indicators of academic success (such as grade point averages) have been shown to be correlated with conscientiousness in traditional (onsite) school classes in psychology (Paunonen [15]), and business (Perlow and Kopp [16]). While the research on learner characteristics that predict success in the online classroom is still evolving, a number of these studies suggest that student personality, and especially, conscientiousness, may be a fertile ground for further inquiry. We, thus, pick up on this vein of thinking, but attempt to replace the inventory measure of Conscientiousness with a more direct measure of this trait that is now available through the archiving characteristic of the online classroom. We, therefore, replace the NEO FFI (self-report) inventory measure of Conscientiousness with conscientiousness measures of student "hits" and "views" on the online class. Specifically, we hypothesize:

Hypothesis 1: E-conscientiousness (conscientiousness in the online learning environment), measured by number of "hits" of course materials, will be positively correlated with online course performance (e-performance).

Hypothesis 2: E-conscientiousness (conscientiousness in the online learning environment), measured by number of "views" of course materials, will be positively correlated with online course performance (e-performance).

2   DATA AND METHODS

Variables measuring student conscientious behavior in the online classroom were examined to determine their relationship to student final grades (i.e., success) in online undergraduate business courses. The variables were: (1) students "hits" of the classroom environment, and (2) students "views" of course materials. Hall and Evans [17] have suggested that the link between student "hits" in an online course (chemistry, in their study) and exam grades were a result of both being a measure of conscientiousness. For this reason, we feel comfortable using student "hits" of the course as a direct measure of the personality factor of conscientiousness. Since conscientiousness also implies thoroughness, we added the concept of student "views" of individual course material items. While "hits" measure the times that a student opens the classroom (perhaps to check a grade, or e-mail a professor), hit behavior itself may not always represent conscientiousness in engaging course material. Therefore, we have added the variable "views" which measures how many times a student has "viewed" each resource item placed in the learning environment by the professor. Resources included readings, videos, hotlinks to websites, etc., all intended to support the course's learning objectives.

Data were collected from students taking either an online or blended business course offered through a small public liberal arts college. The population included 55 students, 25 enrolled in the all online class and 30 enrolled in the blended class. The same instructor taught all students during the academic year 2009-2010. The research, thus, involved the recording and investigation of existing data such that anonymity and confidentiality of the subjects was ensured.

Descriptive and inferential statistics were used to analyze the data for individuals within two groups: (a) students in the all online classroom and (b) students in the blended classroom. At the descriptive level, simple means and frequency distributions were employed. At the inferential level, Pearson product–moment correlation coefficients (Pearson r) were used to determine any statistically significant relationships ($p = <.05$) between each selected independent variable and the grade obtained in the course.

3   RESULTS AND ANALYSIS

3.1   Student Grade Profile (Dependent Variable)

Table 1 profiles the final grades received by the students within this study. Ninety percent of students received a "C-" or better and the modal grade was a "B-."

Table 1. Student Grades (n =55)

Grade	N	Percentage
A	2	.04
A−	8	.15
B+	8	.15
B	7	.13
B−	9	.16
C+	5	.09
C	7	.13
C−	4	.07
D+	2	.04
D	1	.02
F	2	.04
Total	55	100.0

For analysis purposes, the total accumulated points (a continuous, integer variable) was used as the dependent variable. The range of points accumulated in the wholly online class ranged from a low of 104 to a high of 196 out of 200 class points with an average of 163.33 points and a standard deviation of 20.97. The range of points accumulated in the blended class ranged from a low of 46.5 to a high of 94.25 out of 100 class points with an average of 78.03 points and a standard deviation of 10.99.

3.2   Correlational Summary

The Pearson r was the correlation index used to measure the degree of relationship between the 2 independent variables, "hits" and "views" and the dependent variable of total points in the 2 classes. Table 2 summarizes the resulting correlations, and whether they are significant or not (at the $p = <.05$ level). Results indicate that a statistically significant relationship exists within the overall student population between the student's total points in both classes and both the number of hits on the course, and the number of views of instructor-provided online resource material.

Table 2. Pearson Correlation Coefficients

	Online Students (n = 25)	Blended Students (n =30)

Independent Variable	r	Significance		r	Significance
1) Hits	.439	.000*		.412	.000*
2) Views	.624	.000*		.469	.000*

* p = <.05 for one-tailed tests)

3.3   Individual Independent Variable Summary Analyses

Research results for each variable are reported in this section, following the significance level of their correlation coefficients.

1) "Hits" on the course. The number of times a student "hit" the online course was significantly related to the students' total points in the course, for both the wholly online class (r = .439; p = .026) as well as the blended class (r = .412; p = .024). This means that generally the more times the student "hit" the class, the higher his or her grade was in this online class.

2) "Views" of online course material. The number of times a student "viewed" instructor-provided online course material was even more significantly related to the students' total points in both courses (wholly online, r = .624; p = .013; blended, r = .469; p = .019), compared with student "hits." The conscientiousness variable "views" appears even more robust as a predictor of student success (total course points) than the conscientiousness variable "hits."

4   DISCUSSION AND CONCLUSION

This study examined the relationship between undergraduate business school students' success in online courses (e-performance) and two new direct measures of the personality trait conscientiousness (e-conscientiousness). Our correlation analyses suggested 1) that conscientiousness continues to be a solid predictor of academic success, 2) using direct behavioral measures of conscientiousness yields results consistent with, if not more valid than, prior research that linked inventory-based conscientiousness levels to academic performance, and 3) the archiving and data-collection functions of the online classroom represent a rich trove of behavioral data that may be mined for clues to predict student academic success.

We looked at students in both wholly online as well as hybrid (blended) classes and observed similar phenomena: conscientious students who "viewed" online course material more exhaustively, and who "hit" the classroom more frequently, were more likely to accrue more course points leading to higher grades. We were able to directly measure conscientiousness through online course software that allowed for counts of "views" and "hits" of course material and we were impressed by the robustness of both measures. This easily replicable study was thus able to add to the volume of research positing student conscientiousness as a predictor of academic success—this time in the online environment, as well as suggest a potentially fruitful solution to the problem of low construct validity in the use of personality inventories in the educational realm. We are cautiously optimistic about these findings.

Indeed, this exploratory study is obviously limited by the small sample size employed. These were the data immediately available to the researcher; further research will most certainly take advantage of the economies of scale afforded by the online classroom. Indeed, as more faculty teach more online courses, more data will be generated for analysis. This exploration did, however, suggest interesting possibilities in the direct measure of personality traits such as conscientiousness that may be more easily observed through the archived record of the online class. Future research can take a cue from these more direct measures of learner characteristics to propose more complex models of predictors of student learning in the e-environment. Research utilizing larger sample sizes, a wide range of

student majors (drawn from other than the business school), greater diversity of student populations, different types (and nationalities) of higher education institutions, etc., can all be envisioned in the future. In the interim, this exploratory study has 1) confirmed the predictive power of conscientiousness in the online classroom, 2) introduced direct behavioral measures of such conscientiousness made possible by the technology inherent in the online classroom, and 3) suggested the power of the online classroom as a laboratory in educational as well as social science inquiry.

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