

THE ROLE OF PERSONALITY in Web-based Distance Education Courses

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Before investing in a Web-based education program, managers should consider how effective it will be when paired with employee personality traits.

THE MIS FIELD requires its participants to engage in continuous education to remain up to date. One approach to meeting this demand is through the use of a Web-based virtual learning environment (VLE). One type of VLE is totally Web-based education (TWE), which requires no class meetings and little instructor contact. When we consider the conveniences of TWE courses to today's globally expanding firms, the ever-increasing bandwidth of the Internet leading to improvements in TWE course interactivity and quality, and the pennies-to-dollars cost of operating TWE course offerings, it is obvious that TWE courses are necessary, and will be more pervasive with each passing year [10].

The recent evolution in the delivery of education has resulted in much debate on the effectiveness of distance education via TWE courses [1, 3, 9]. While both pro and con positions of this debate raise important issues, in our view, both sides of this debate have overlooked an important factor, one that involves the personality characteristics of prospective students. Research dating back to the 1960s demonstrates that an individual's personality characteristics are good predictors of future training and learning performance [11]. Inspired by this research, we believe that the personality characteristics

that contribute to student learning should be assessed in order to determine who is most certain to benefit from TWE courses. Just as students must qualify for college, so too should prospective students be qualified to take TWE courses by their personality characteristics.

As a study by Mount and Barrick [8] illustrates, much research has been directed at establishing relationships between individual personality characteristics and learning performance. These researchers found that characteristics such as "stability," "openness," "conscientiousness," "agreeableness," and "extraversion" (referred to as the "big five" personality characteristics) are all related to some type of learning performance.

Most of the prior research on VLE learning is focused on issues such as learner satisfaction, interface design, or attitude of learners [2]. However, some researchers suggest that effective learning in a VLE, compared to traditional classrooms, has been observed for mature and motivated learners while less motivated learners tend to suffer [5]. A VLE, especially Web-based courses, has inherent problems in settings where users lack the abilities required to take full advantage of the medium [4]. But no research to date has directly examined whether students' personality characteristics caused them to have

Wonderlic Personality Characteristics Inventory (PCI) Scales	Definitions	Relationship with Grade Performance (Statistical significance)	Corresponding Subscales	Subscale Relationship with Grade Performance (Statistical significance)
Agreeableness	A tendency to be courteous, helpful, trusting, good-natured, cooperative, tolerant, and forgiving.	High (p<0.001)	Cooperation Consideration	Moderate (p=0.039) High (p<0.002)
Extraversion	A tendency to be sociable, gregarious, talkative, assertive, adventurous, active, energetic, and ambitious.	Moderate (p=0.044)	Sociability Need for recognition Leadership orientation	Low (p=0.332) Low (p=0.441) High (p<0.001)
Conscientiousness	A tendency to be hardworking, dependable, efficient, and achievement striving.	Moderate (p=0.014)	Dependability Achievement striving Efficiency	Low (p=0.586) High (p<0.003) Low (p=0.456)
Stability	A tendency to handle stress, to maintain an even temperament, and to have a high degree of composure and self-confidence across most situations.	High (p<0.001)	Even-temperament Self-confidence	Moderate (p=0.029) Moderate (p=0.040)
Openness	A tendency to be imaginative, cultured, curious, polished, original, broadminded, intelligent, and artistically sensitive.	High (p<0.001)	Abstract thinking Creative thinking	Low (p=0.616) High (p<0.001)

Table 1. Personality characteristics and their relationships with grade performance.

trouble with a TWE course. If there is a significant performance difference among TWE course students depending on personality, it may be desirable to evaluate personality characteristics in advance to determine if a TWE program is the most appropriate educational format for them.

Testing Personality

Is there a relationship between personality characteristics and grade performance in TWE courses? If so, can the relationship be used to discriminate between high-performing and low-performing students for the purpose of selecting candidates for TWE courses?

To answer these questions it was necessary to have measures for comparison on both subject personality characteristics and on learning performance. For this job we selected the Wonderlic Personality Characteristics Inventory (PCI) survey assessment instrument [12], a measuring instrument whose 50-year history of applications would be unquestionably reliable and valid to academic researchers. This instrument was also easily attainable (and affordable) for commercial use by practitioners. The PCI has been widely used among psychology researchers to provide measurement scales of the “big five” personality characteristics dimensions shown in Table 1. The PCI also provides a further breakdown of the characteristics with a series of 12 subscales measures (see Table 1), each providing a unique glimpse of components of an individual’s personality. The survey instrument consists of 150 questions, covering the “big five” scale, the 12 subscales, and an additional measurement scale for “success” characteristics

such as teamwork, integrity, commitment to work, and learning orientation (see Table 2). All of the scales and subscales are based on an index score ranging from 0 to 100%, where 100% represents a high degree of the particular personality characteristic. The PCI instrument’s scales are designed to be used individually or together in models for predicting an individual’s potential for handling particular jobs or training. Comparisons with the PCI instrument scales and subscales are the basic measures of personality characteristics used in this study.

To obtain measures of learning performance, we selected junior-

level college students taking their first introductory MIS course as the sample for this research. We felt these students represented a less biased sample since they had no previous MIS education or experience to cause learning dissonance. The course was a TWE self-paced course and was delivered to students via the Web using the Blackboard Educational Software System. Students were required to use a textbook [6], its supplementary materials (which included a CD-based workbook that provided sample test questions, interactive learning simulators, and additional problem solutions), and an instructor-prepared Web-based MS PowerPoint slide presentation on each chapter as preparation for the exams. The slide presentation provided extensive textbook content with animated diagrams structured in a programmed-learning format to make it easy for students to learn on their own. The exams were available to be taken at the convenience of the student online through the Blackboard Web delivery system during the semester. The exam scores were combined into a percentage as a learning achievement measure used to gauge their learning performance. Achievement reflected in grades is important because the Web-course effectiveness of learning is measured in terms of students’ achievement and satisfaction [7]. These learning achievement scores are hereafter referred to as “grade performance” measures, and are used in statistical comparisons with the personality characteristic measures from each student.

A total of 140 students were randomly selected as the subjects from a single class of over 200 who participated in the survey. These students ranged in age from

20 to 30 years, with a mean of 22.5 years. Participation and use of the PCI instrument by the students met all the requirements suggested by the Wonderlic Organization for a valid and reliable survey experience. Also, Wonderlic consistency statistics built into the survey instrument confirmed the validity of the student's answers.

Survey Results

Is there a relationship between personality characteristics and grade performance in TWE courses? To answer this question correlations coefficients were computed between the personality characteristic measures and the grade performance measures for all 140 students. Having met all the necessary and sufficient conditions for an accurate statistical application, the resulting significant relationships (a value of $p < 0.05$) between the five personality characteristics in Table 1 are listed as either "high" or "moderate." All "low" relationships represent statistically insignificant or non-relationships (a value of $p > 0.05$). Since all five of the characteristic measures turned out to be significantly related to grade performance but had differing degrees of significance (high to moderate), we computed the correlations with each of the 12 subscales to see if any subscale personality characteristics might differentiate grade performance.

Interestingly, but not surprisingly, the subscales measuring personality characteristics that tend to support the learning climate in a traditional classroom setting, such as "sociability" and the "need for recognition" appear not to be related to grade performance. Also, the "abstract thinking" subscale is logically not required in TWE courses, since the content was presented in a more "programmed learning" format. The subscale personality characteristics of "dependability" and "efficiency" also dropped out. Since the TWE in this study was self-paced with only one deadline for all exam grades, the usual need to be efficient and dependable in meeting multiple semester deadlines on exams and homework typical of the traditional classroom appears not to be a personality characteristic requirement in a successful prospective TWE student in our study.

We further examined the use of the PCI "success" scales to determine if these personality characteristics show any relationship with grade performance. As shown in Table 2, we found that while, logically, "commitment to work" and "learning orientation" were

highly related to grade performance, the personality characteristics of "teamwork" and "integrity" were not. The TWE course in this study was performed by individual effort, not requiring team effort, and it is virtually impossible to show altruistic behavior in the TWE course environment of this study. Those students

Wonderlic PCI Success Scales	Definitions	Relationship with Grade Performance
Teamwork	The tendency of how well an individual might work with others and cooperate in groups.	Low ($p=0.456$)
Integrity	The tendency of altruistic behavior.	Low ($p=0.881$)
Commitment to work	The tendency to remain on a job for a long time, and not be undependable, irresponsible, impulsive, disorganized, or lack persistence.	High ($p<0.001$)
Learning orientation	The tendency of an individual to be willing to engage in activities to acquire knowledge, skills, and behaviors and to learn new methods and procedures to improve job effectiveness, how interested they are in developing themselves, seek opportunities to learn new and different ways of doing things, and enrolled in training programs that they are likely to be active and fully engaged participants.	High ($p<0.001$)

Table 2. Success scales and their relationship with grade performance.

whose high scores centered on the characteristics of "teamwork" and "integrity" might need these types of personality expression as outlets for their educational growth, but

they may not be ideal prospective TWE course students in our introductory MIS course.

In summary, we found a student's grade performance of this TWE course does show a significant relationship with a number of personality characteristics. The ideal prospective TWE student for the introductory MIS course in this study is compliantly cooperative, considerate, even-tempered, self-confident, a creative thinker, committed to work, shows leadership, needs to achieve, and has a positive learning orientation.

Table 3. Accuracy of personality characteristics in discriminating between high and low performers.

	High Performer Identified	Low Performer Identified	Total Comparisons
Actual High Performer	125 (99.2%)	1 (00.8%)	126 (100.00%)
Actual Low Performer	2 (01.6%)	124 (98.4%)	126 (100.00%)

Our findings may be limited in terms of other types of distance education pedagogy. That is, TWE courses that use other types of educational methodologies, like interactive chat sessions, where a characteristic like "teamwork" may be a significant factor, might show differing statistical results. Since this study is the first of its kind dealing with TWE and personality characteristics, we sought only to establish the connection personality characteristics and student grade performance, rather than to define the relationship with all possible educational pedagogy. Indeed, due to the interactive effects of differing pedagogy on the learning experience of students and the differing types of educational content that can be taught in TWE, it may be impossible to

determine which pedagogy and personality characteristics are the best combination for improving grade performance.

Can the relationship between personality characteristics and grade performance be used to distinguish between high- and low-performing students for the purpose of selecting candidates for TWE courses? A simple comparative test is used to determine discrimination, or selection, accuracy. We took the 14 students whose grade performance was in the top 10% of the sample and designated them as "high performers" for this test and we took the 14 students whose grade performance was in the bottom 10% and designated them as "low performers." We then computed the mean subscale scores for all seven of the significant personality characteristics in Table 1 and the mean of the two success scale scores in Table 2, based on the student sample of 140. If the personality characteristics do in fact discriminate between the high- and low-performers, then each of the high-performing students should have all nine (7 + 2) scores fall above average, and the low performers should have their nine scores fall below average.

The results of the 126 comparisons (14 students times 9 scores each) for both the high and low performers (a grand total of 252 comparisons) are presented in Table 3. With little exception, the resulting scale scores distinguished exactly as they should—those students who can expect to have high grades in a TWE course from those who will have low grades. Clearly in this study, the personality characteristics of the students can easily discriminate for purposes of selection between the highest performing and lowest performing students in the TWE course.

While the age range of the undergraduate students in this study was limited to young adults, the potential market for TWE courses clearly includes older adults. In response to this limiting factor of our study, a small sampling of 23 students taking a TWE quantitative methods graduate MBA course was examined. These students ranged in age from 28 to 52 years, with a mean of 34.7 years. In this TWE MBA course, the education materials were slightly different, and included Web-based reading material (no textbook), with supporting technology like pop-up windows for tables and animated diagrams and figures. All other educational materials and environmental factors, including the means of testing this older group sample, were similar to the undergraduate study. Running the same set of statistics on this subsequent group resulted in the same five personality characteristics being significant, although not as statistically significant (at the moderate level of $p < 0.040$) as the larger undergraduate result. Given the smaller sample size, the loss of statistical significance is quite understandable.

We feel this smaller subsequent sample of a graduate class helps to confirm the importance the five personality characteristics found in the undergraduate study, and supports the reliability and validity of our study's claims.

Conclusion

While the single class sample of this study limits its generalizability, the obvious strengths of these analyses still demonstrate that a student's personality characteristics, as measured by the PCI survey instrument, can be a strong indicator of resulting grade achievement. As such, we feel that personality characteristics are worth measuring as qualifying criteria to take TWE courses.

Using the methodology presented here for other TWE courses requires a careful analysis of the learning skills desired, and their relationship with the scales and subscales of the PCI survey instrument. Our statistics presented here can be used as a beginning point for that analysis. Such an analysis might help prospective students get some idea of their future learning performance in a TWE course, and provide companies who fund the TWE courses some idea as to how well these courses might warrant their investment of time and money. ■

REFERENCES

1. Bruckman, A. The future of e-learning communities. *Commun. ACM* 45, 4 (Apr. 2002), 60–63.
2. Cardler, J. Summary of current research and evaluation of findings on technology in education, Working Paper, Educational Support Systems, San Mateo, CA, (1997).
3. Decker, T., et al. Debating distance learning. *Commun. ACM* 43, 2 (Feb. 2000), 11–15.
4. Heller, R. The role of hypermedia in education: A look at research issues. *Journal of Research on Computing in Education* 22, 4 (1990), 431–441.
5. Hiltz, S. *The Virtual Classroom: Learning without Limits Via Computer Networks*. Albex Publishing, Norwood, NJ, 1993.
6. Laudon, K., and Laudon, J. *Management Information Systems, 7th ed.* Prentice-Hall, Upper Saddle River, NJ, 2002.
7. Maki, R., Maki, W., Patterson, M., and Whittmaker, P. Evaluation of a Web-based introductory psychology course: Learning and satisfaction in on-line versus lecture courses. *Behavior Research Methods, Instruments, and Computers* 32, 2 (2000), 230–239.
8. Mount, M., and Barrick, Murray R. Five reasons why the 'big five' article has been frequently cited. *Personnel Psychology* 51, 4 (Winter 1998), 849–857.
9. Phoha, V. Can a course be taught entirely via email? *Commun. ACM* 42, 9 (Sept. 1999), 29–30.
10. Tsichritzis, D. Reengineering the university. *Commun. ACM* 42, 6 (June 1999), 93–100.
11. Wiggins, N., Blackburn, M., and Hackman, J. The prediction of first-year graduate success in psychology. *Journal of Educational Research* 63, (1969).
12. Wonderlic, Inc. 2002 Resource Guide; www.wonderlic.com.

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