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Eyong B. Kim

University of Hartford, ekim@hartford.edu

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STUDENT CHARACTERISTICS AS PREDICTORS FOR ONLINE COURSE SUCCESS

Eyong B. Kim, Department of Management, University of Hartford, West Hartford, CT, USA,
ekim@hartford.edu

Abstract

This study reviews the findings of previous empirical research published between the years of 2000 to 2009 on online effectiveness and student characteristics. A total of six research articles are identified and analyzed in terms of research design and findings. To improve online course effectiveness, research findings are summarized and analyzed. Some inconsistencies have been discovered and discussed.

Keywords: Student characteristics, Online course effectiveness, Perceived learning outcome, Personality

1 INTRODUCTION

Online courses are getting popular among teaching institutions nowadays. These electronic learning (e-learning) courses utilize a variety of methods such as computer-based learning, virtual classrooms, Web-based learning, and using other Internet technologies. Most universities and colleges currently offer online courses utilizing Web technologies. Khan (1997) defined Web-based instruction as a hypermedia based instructional program that utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported. Students often enroll in an online course because it is more convenient, flexible, the materials are more current, and they can gain access from anywhere (Kiser 1999). Online courses are preferred to traditional classroom courses because it can offer a variety of course activities such as a discussion forum (Tello 2007) and students are satisfied with it (Levy, 2007). Due to these reasons, students seemed to like taking online courses if they are offered.

Even though online courses provide many convenient factors to students, if students do not learn as much from online courses compared to traditional classroom courses, universities need to utilize more traditional classroom courses. In other words, online courses should be the same or more effective than traditional classroom courses in terms of student learning outcomes. Meta-analysis of previous research found that Web-based instruction is 6% more effective than traditional classroom instruction for teaching declarative knowledge and equally effective for teaching procedural knowledge (Sitzman, 2006).

Arbaugh et al. (2009) suggested that online courses are at least comparable to classroom-based courses in achieving desired learning outcomes based on a review of literature of 180 articles. Online courses and classroom-based courses may be equally effective in terms of effectiveness, but many students felt traditional courses can provide the human energy, charisma, personality, and appeal generated by a good instructor more dramatically in a face-to-face setting and inspire more learning (Rovai and Barnum 2003).

To find out the factors influencing the learning outcomes of an online course, there have been several empirical studies. Among those, this study will review the research that investigated student characteristics such as motivation, learning style or personality if their findings are inconclusive

2 PREVIOUS RESEARCH ON THE EFFECTIVENESS OF ONLINE COURSES

2.1 What Influences the Effectiveness of Online Courses?

Learning is a complex process and there could be many different factors influencing the learning outcome. Some of them are, cognitive skills to take full advantage of the Web medium (Trumbull, Gay & Mazur 1992), the student's learning strategy (Jonassen 1985), student's maturity and motivation (Hiltz 1995; Lawther & Walker 2001), overall emphasis on analytical and planning skills (Dacko 2001) and others. Some researchers suggested that studying in an online course could be as effective as traditional instruction if some conditions are met: the methods and technologies used are appropriate to the instructional tasks, interactions exist among students, and timely feedback between teacher and student (Moore & Thompson 1990; Verduin & Clark 1991).

To measure the effectiveness of Web-based courses, a comprehensive framework was suggested by Piccoli, Ahmad, and Ives (2001). Their model includes the variables of performance, self-efficacy, and satisfaction in the effectiveness dimension and these are influenced by variables in the human dimension and the design dimension. The human dimension has variables of students and instructor, while the design dimension includes variables of learning model, technology, learning control, content, and interaction. In their model, the human dimension has a student sub-dimension including maturity,

motivation, technology comfort, technology attitudes, previous experience, computer anxiety, and epistemic beliefs. The instructor sub-dimension includes technology control, technology attitudes, teaching style, self-efficacy, and availability. They claimed that their model would allow researchers to analyze Web-based course effectiveness systematically.

Because online courses are delivered over the Web, issues related to the technology could influence the learning outcome. Leidner and Jarvenpaa (1995) suggest that universities need to match technologies to learning models to achieve effective teaching and learning. However, several researchers found that the course delivery medium is not a significant factor for the learning outcome (Clark 1994; Russell 1999). It is argued that, for online courses, how effectively the medium is exploited in the teaching and learning situation is more important than the medium itself (Owston 1997). Based on the review of research on online course effectiveness, common factors in learning such as learning tasks, learner characteristics, student motivation and the instructor, are more significant than the technology (Merisotis & Phipps 1999). Selim (2007) found eight critical success factors of online courses: instructor's attitude towards and control of the technology, instructor's teaching style, student motivation and technical competency, student interactive collaboration, e-learning course content and structure, ease of on-campus internet access, effectiveness of information technology infrastructure, and university support of e-learning activities. The teacher will continue to play a central role in online education as a learning catalyst and knowledge navigator alongside the Internet (Volery & Lord 2000). As such, human-related issues are more important in online course effectiveness than technology related issues overall.

Among the human related issues, researchers have considered student motivation and learning style as important variables influencing the learning outcome (e.g., Piccoli, Ahmad & Ives 2001; Lawther & Walker 2001; Jonnassen 1985). Eom, Wen, and Ashill (2006) found that student learning style has a significant impact on the perceived learning outcome of Web-based courses.

2.2 Students' Learning Style

The learning style makes the same teaching method effective for some students and ineffective for others because it is believed that different students learn differently. Learning style is a set of personal characteristics imposed biologically and developmentally that makes the effectiveness of a course vary among students (Dunn, Beaudry & Klavas 1989). Many researchers have suggested that students' learning styles have a significant impact on online course effectiveness (Barnes, Preziosi & Gooden 2004; Dunn, Beaudry & Klavas 2002).

Because every student has a different learning style, there have been many different models of learning styles introduced in the literature. Some of them include the Kolb learning preference model (Kolb 1984), Gardner's theory of multiple intelligence (Gardner 1983), and the Myers-Briggs Personality Type Indicators (MBTI). The personality measure, MBTI profile, not only measures personality but also has strong learning style implications (Pittenger 1993).

If instructors use a reliable and valid learning style preference instrument to assess students' learning styles, they may use this as a basis for providing responsive instruction. Matching teaching style and students' learning styles is important to student satisfaction and learning effectiveness. Dunn, Beaudry, and Klavas (2002) concluded that students' achievement increases when teaching methods match their learning styles, especially biological and developmental characteristics that affect how they learn. It is possible that the student's learning style may not be the most influential in learning effectiveness because there are too many other variables affecting learning effectiveness (Meils 2004; Stellwagen 2001).

2.3 Student Self-Motivation

Another important aspect in effective learning is students' motivation in all learning environments, including online courses. Self-motivation is defined as the self-generated energy that gives behavior

direction toward a particular goal (Zimmerman 1994). It is even more important because students are taking online courses in a remote location and in a self-paced learning environment. Often self-motivation is considered one of the important factors (critical success factors) of online success (Schrum & Hong 2002; Washull 2005). Frankola (2001) found that completion rates of online education had a strong relationship with student motivation. Not only in an online environment, but in general, self-motivation is considered one of the major factors differentiating successful students and less successful students (Dembo & Eaton 2000).

It is true that there are differences among students how much motivation each has toward work or study. Some students are very strongly motivated to do work while others lack the intrinsic motivation. Several researchers explained that motivation is highly related to the personality of a human being (Chamorro-Premuzic & Furnham 2005; Major, Turner & Fletcher 2006). Students' personalities influence many aspects of the learning process, such as their attitude toward a course, how they interact with others, motivation, etc. A person's personality is often measured using the Myers-Briggs Personality Type Indicators (MBTI) (Myers & Briggs 1995), the Big-Five Model of personality (Barrick & Mount 1991; Costa & McCrae 1988; John, Donahue & Kentle 1991) and others.

3 SELECTION CRITERIA AND ANALYSIS

As the framework of online course effectiveness introduced by Piccolli, Ahmad, and Ives (2001), there could be many different factors affecting the effectiveness of online education. Based on their model, effectiveness of online education can be measured in three different aspects: performance, self-efficacy, and satisfaction. These three effectiveness measures are related to two main dimensions: human dimension and design dimension. The human dimension has two main subdimensions – student and instructor. Between these two subdimensions, this study will focus on the effects of students' characteristics on the effectiveness of online education (performance, self-efficacy, and satisfaction). As described in the previous section, the student subdimension has many factors such as maturity, motivation, technology comfort, technology attitudes, previous experience, computer anxiety, and epistemic beliefs. Among these factors, this study will focus on the factors related to the students' personality such as maturity, motivation, learning style and others.

In the period of 2000 to 2009, the published studies that investigated human dimensions had three different research streams in general, such as relationships of personality with performance, finding critical success factors of online courses, and comparing the effectiveness of online courses and traditional classroom courses. Thus, this study will include any published empirical research from 2000 to 2009 that includes the student personality characteristics as factors influencing online course effectiveness (performance or satisfaction). Based on these selection criteria, the author compiled seven previous studies as shown in Table 1.

Authors	Findings
Barnes, (2004)	learning style differences exist among students enrolled in online courses; Among the Kolb's four learning modes, two-thirds of students exhibited Diverger style, one-third has Assimilator learning styles; two other learning styles were nearly absent (Accommodator and Converger style); students prefer certain delivery method
Berenson, R (2008)	EI is the primary predictor for GPA; EI and personality is stronger predictor for GPA; resilience is not a predictor for GPA; Positive correlation between EI and age
Eom, S B (2006)	All six factors influence students satisfaction; learning style and instructor feedback influence the perceived learning outcome; insignificant relationships between online course structure and perceived learning outcome; no significant

	relationships between student self-motivation and perceived learning outcome
Kim, E B. (2004)	All five personality characteristics are significant predictors of course grades.
Schniederjans, M., (2005)	Four personality characteristics (conscientiousness; openness to experience; emotional stability; agreeableness) are significant predictors of course grades.
Selim, H. M (2007)	Eight CSFs are identified: instructor's attitude towards and control of the technology; instructor's teaching style; student motivation and technical competency; student interactive collaboration; e-learning course content and structure; ease of on-campus internet access; effectiveness of information technology infrastructure, university support of e-learning activities
Waschull, S. B (2005)	self-discipline/ motivation significantly correlates with the grades; technology factors (access & experience) are not significantly related to performance

Table 1. Findings of Empirical studies measuring student's personality characteristics and online course effectiveness in year 2000 – 2009

4 ANALYSIS AND DISCUSSION

To examine the possible inconclusive findings among these studies, the author analyzed and summarized attributes of each study. They are, online course subject, sample size, sample demographics, region of study, statistics used, and if a study has predictors.

4.1 Descriptive Characteristics of Previous Studies

The first noticeable finding is every study used different sample sizes and course subject domains. The course subjects range from any department in a two year technical college (40 online courses), any online course offered at one university, junior level online MIS introduction courses, online courses in business/economics, psychology online courses, and business online courses. Sample size varied, such as 82, 397, 140, 260, 538, 57, and 44. Study participants ages also varied. They are, students 18 to 57 years old, any students who took an online course in a college, students in the age range of 20 to 30 years old, 19 to 31 years old students, any undergraduate students, and MBA students. All studies were conducted in the United States except one study that was done in United Arab Emirates. As described, previous studies utilized a variety of different numbers of online courses, sample sizes, sample characteristics, and course subjects to measure different aspects of online course effectiveness.

4.2 Statistics and Measuring Tools Used

Researchers use wide variety of empirical research methods to investigate the effectiveness of e-learning education. For example, some of the methods previous research employed are Factor Analysis (Principal component analysis) and regression analysis (Peltier, Drago & Schibrowsky 2003), Structural Equation Modeling: PLS Graph (Eom, Ashill & Wen, 2006), AMOS (LaPointe & Gunawardena 2004), LISREL (Marks, Sibley & Arbaugh 2005), Analysis of variance and inter-item correlations analyses (Swan 2001), and Case study (Kellogg & Smith 2009).

Selected previous research in this study used different statistical analysis methods that fit most to their study. They are, inter-co relational analysis, one-way ANOVA, Structural Equation Model (SEM), PLS Graph, Confirmatory Factor Model (CFM), Regression, Factor analysis (first order correlation), Chi square, and Descriptive statistics.

To measure different dimensions of student characteristics, different tools were employed. They are, EI Survey (EI-Q abridged) by www.psychtest.com, personality survey (ACT) (warren 2002), IDEA (Individual Development & Educational Assessment, by Kansas State U), Wonderick Personal

Characteristic Inventory (PCI), author developed questionnaire, and Kolb Learning-Style Inventory. The independent variables, dependent variables, and methods used are summarized in Table 2.

Study	Independent Variables	Dependent Variables	Methods
Barnes (2004)	learning style, course delivery methods	descriptive study to find out learning style differences and delivery method evaluation	Kolb Learning Style Inventory, survey
Berenson, R (2008)	emotional intelligence; personality, resilience	self reported GPA	EI-Q abridged survey, ACT personality survey
Eom, S B (2006)	student self-motivation; student learning style; instructor knowledge and facilitation; instructor feedback; interaction; course structure	perceived student satisfaction; learning outcome	Structural Equational Modeling, PLS Graph, IDEA ((Individual Development & Educational Assessment))
Kim, E B. (2004)	Big Five personality (conscientiousness; openness to experience; emotional stability; extraversion; agreeableness)	grade	Regression, Wonderick Personal Characteristic Inventory (PCI)
Schniederjans, M., (2005)	Big Five personality (conscientiousness; openness to experience; emotional stability; extraversion; agreeableness)	grade	Regression, Wonderick Personal Characteristic Inventory (PCI)
Selim, H. M (2007)	instructor characteristics, student characteristics, technology, university support	Critical Success Factors (CSF) of e-learning	Confirmatory factor model
Waschull, S. B (2005)	personal traits, life style, motivation, study skill, learning preference, technology access, technology experience	grade	author developed questionnaire, inter-correlation analysis

Table 2. Summary of Previous Study Variables and Methods

4.3 Finding and Discussion

As shown in the Table 2, some inconsistent results exist among the previous research. First, the Kim and Schniederjans study (2004) has different results from the study done by Schniederjans and Kim study (2005) even though the studies are very similar. Both of them used the same online course offered at one university (Junior level MIS introduction course), a similar age group student sample (average ages of 22.5 and 22.1), and used the same tool (Wonderick Personal Characteristic Inventory). However, the study done by Kim and Schniederjans (2004) found all Big-Five personality factors (conscientiousness;

openness to experience; emotional stability; extraversion; agreeableness) are significant predictor of a course grade while Schniederjans and Kim study (2005) found that extraversion as a personality characteristic is not a significant determinant for course grade. This discrepancy happens because the studies used different sample sizes: 140 subjects in the 2004 study while 260 subject participated in the 2005 study. This result is because the larger size sample produces more accurate statistical test results.

Second, it was found out that student motivation is a critical success factor of an online course (Selim 2007). In another study, student motivation did not influence the perceived learning performance (Eom, Wen & Ashill 2006). Selim (2006) developed the questionnaire to survey 538 undergraduate students who enrolled in 37 class sections of five mandatory laptop-based business and economics courses at the United Arab Emirates University. Even though the courses selected for his study combine both e-learning and traditional learning tools, Selim claimed his study measured only e-learning related aspects. To specify and validate underlying critical indicators in each of the e-learning CSF categories, he conducted a confirmatory factor models (CFMs) approach that results eight categories for e-learning CSFs. To test hypotheses, Eom, Wen & Ashill (2006) used a quantitative survey of satisfaction and learning outcome perceptions of students who have taken at least one online course. They surveyed 397 students using IDEA (Individual Development & Educational Assessment) which is a student rating system developed by Kansas State University. Their research model was tested using the structural equation model-based PLS methodology. One of their study findings, student motivation did not influence perceived learning performance, was contradictory to not only Selim's study (2007) but to many other studies (Hiltz 1993; Lawther and Walker, 2001).

One possible hypothetical explanation is that Selim's study selected participants in the age range of 17 to 22 (97% of sample population) while the age range of participants in Eom, Wen & Ashill (2006) was widely varied (40% of participants are under 25; 36% is between 25-34 years; remaining 24% participants are 35 or older). The age range of a sample may have contributed to the insignificant relationship between student motivation and perceived learning performance as well as differences in degree program (58% in undergraduate and 48% in graduate program). Wolfgang and Dowling (1981) suggested that adult students and younger students have significant different motivation factors in college education. For example, older students have a strong motivational factor of cognitive interest and lower scores on social relationships and external expectations. Older students prefer learning formats such as contract learning, television, and independent study that require the student to be more of an inner-directed learner. On the other hand, traditional age students prefer large class meetings of peers, a solid core of academic requirements, and courses with clearly expressed teacher expectations. Based on the findings of Wolfgang and Dowling (1981), it might be said that Eom, Wen & Ashill (2006) study finding is consistent with the previous study.

Based on the review of student characteristic related empirical research conducted from 2000 to 2009, the main findings can be summarized as follows:

- Emotional intelligence is the primary predictor for GPA in online courses.
- Self-discipline/motivation is significantly correlated with online course grades.
- Among the Big Five personality dimensions, four personality characteristics (conscientiousness, openness to experience, emotional stability, agreeableness) are significant predictors of course grades.
- Student satisfaction of online courses is influenced by student self-motivation, student learning style, instructor knowledge and facilitation, instructor feedback, interaction, and course structure.
- There exists learning style differences among students enrolled in an online course. Among the Kolb's four learning modes, two-thirds of students exhibited Diverger style and one-third had Assimilator learning styles.
- Eight CSFs were identified, such as instructor's attitude towards and control of the technology, instructor's teaching style, student motivation and technical competency, student interactive collaboration, e-learning course content and structure, ease of on-campus internet access, effectiveness of information technology infrastructure, and university support of e-learning activities.

In addition, while the authors conducted research, they found some additional facts about the online courses. The type of program being undertaken, access to the Internet at home, and ethnic background were not influencing factors of online course performance (Volery & Lord 2000). A lower level of learning in online courses is more of a perception than reality, as is learning more if students attended a classroom course (Rovai & Barnum 2003). It was also found students prefer traditional classroom courses to online courses (Rovai & Barnum 2003).

As a preliminary study on online course performance and student characteristics, this study has limitations such as:

It includes previous studies published from the years 2000 to 2009. It may be more insightful and valid if a longer time horizon is covered.

Student characteristics may include a greater number of factors if research from education theory, behavioral psychology, and cognitive psychology studies are included. In other words, it may be necessary to include human learning research to understand the effects of an online course to student learning accurately.

When a researcher conducts an empirical study, good size of sample and their characteristics should get more attention. The most important limitations of this study are the narrow search domains of previous studies. As a preliminary study of this topic, the author did not search thoroughly for all possible previous studies. As more research are included, more insights and interesting findings can be discussed to determine whether the conclusions are consistent with each other.

5 CONCLUSION

It is often said that online courses are convenient but students may learn less than they would from traditional classroom courses. However, many previous researchers suggest that students' performance in online courses is not significantly different from traditional courses (Beare 1999; Fox 1998; McKissack 1997). As the Internet and World Wide Web technology advances, technology factors are less significant than human factors for online education success. Thus, it is necessary to validate the research claims made in the early days of online courses when the Internet tools were not as developed as they are today.

Reviewing the previous research of student characteristics can give us insights on the curriculum design of online courses to fit student learning style, personality, emotional intelligence level, and other characteristics.

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