2011

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Recommended Citation

Galy, Edith, et al. "The Effect of Using E-Learning Tools in Online and Campus-Based Classrooms on Student Performance." Journal of Information Technology Education: Research, vol. 10, 2011, pp. 209–30. doi:10.28945/1503.

The Effect of Using E-Learning Tools in Online and Campus-based Classrooms on Student Performance

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Executive Summary

Creating an integrative research framework that extends a model frequently used in the Information Systems field, the Technology Acceptance Model, together with variables used in the Education field, this empirical study investigates the factors influencing student performance as reflected by their final course grade. The Technology Acceptance Model explains computer acceptance in general terms. The model measures the impact of external variables on internal beliefs, attitudes, and intentions. Perceived Usefulness and Perceived Ease of Use, two main constructs in the model, refer to an individual's perception of how the adoption of a new technology will increase their efficiency, and the individual's perception of how easy the technology will be to use. The lower the perceived effort is, the easier the technology will be to adopt. Thus, Perceived Usefulness, Perceived Ease of Use, Computer Self-Efficacy, and Computer Anxiety were measured to determine their effect on student performance.

The proliferation of the personal computer was possible because of the applications written for it. The continuous creation of new applications has created ample ground to test the Technology Acceptance Model to determine how a user will decide to adopt such applications. The recent escalation of delivering online education via the Internet has again sparked a new dimension of information systems. This has given rise to research using the Technology Acceptance Model for applications in the Education field.

Today's modern classroom, whether online or campus-based, uses e-learning tools and Learning Management Systems that capture student cognition and engages them in the learning process via technology, while increasing their need for self-directedness. In view of this, the present study also considers the students' ability to work independently.

The results of the statistical analysis used in this study revealed marked differences in student perceptions of e-learning tools between students who chose to take an online course and students who preferred to take the campus-based section. Additionally, Perceived Usefulness, Perceived Ease of Use, and the students' ability to work independently were all statistically significant factors in predicting students' final grades.

Keywords: E-Learning Tools, Technology Acceptance Model (TAM), Perceived Usefulness, Perceived Ease of Use, , Computer Self-Efficacy, Computer Anxiety, Ability to Work Independently, Distance Education

Editor: Peter Blakey

Introduction

In the 2006–2007 academic year, 2-year and 4-year institutions reported an estimated 12.2 million enrollments in college-level, credit-granting Distance Education (DE) courses. Of these DE enrollments, 77 percent were reported in online courses, 12 percent were reported in hybrid/blended online courses, and 10 percent were reported in other types of DE courses including correspondence courses (Parsad & Lewis, 2008). The U.S. Department of Education (Parsad & Lewis, 2008) reported that in 2006-2007 universities augmented online courses mainly because students required flexibility in their schedules, and to reach students who would not have had access to a college education. Doyle (2009) reports that 3.9 million students registered for classes in the Fall 2007 semester were taking at least one online course. Allen & Seaman (2010b) report that there was a 17% increase in the Fall of 2008, and that one of four higher education students have at least taken one online course. In the Fall of 2009, the number of students taking at least one online course rose to 5.6 million, a 21% increase from the previous year (Allen & Seaman, 2010a). However, DE has evolved as students choose to add online courses onto their existing, campus-based curriculum. In other words, students are seeking to complement, not substitute, campus-based education. Adding to the validity of this phenomenon is that students take online courses in institutions close to their homes with three-fourths of online students living less than 40 miles from their school.

Current trends in education confirm that instructors are shifting away from authoritarian and non-interactive courses. Students have gained control in their courses with the aid of two-way communication, as well as group-oriented activities (Lou, Bernard, & Abrami, 2006). Student self-directed courses use audio, videotapes, and other web-based resources. E-learning, defined as computer networked technology to provide course material and content (Welsh, Wanberg, Brown, & Simmering, 2003), is increasing. Beginning in 2003, the Sloan Consortium (Sloan-C) has conducted annual reports concerning DE trends in the United States. Sloan-C provides the following definitions that are useful in distinguishing classroom types:

- Traditional – Course without online technology used; therefore, 0% of content is delivered online,
- Web Facilitated – Courses that use web-based technology to facilitate what is essentially a face-to-face course and may use a Learning Management System or web pages to post syllabus and assignments. Less than 30% of the content is delivered online,
- Blended/Hybrid – Substantial proportion of content is delivered online, typically uses online discussions and has a reduced number of face-to-face meetings. 30-79% of the content is delivered online,
- Online – More than 80% of the content is delivered online. Typically there are no face-to-face meetings.

The advent of e-learning as part of the collaborative learning paradigm includes Web 2.0 technologies, which are widely used by our students and are now making their way into the classroom. Instructors are finding these new technologies very useful additions to their DE classrooms as they can enhance learning among our tech savvy students, mirroring the use of these technologies in their daily lives. Web 2.0 technologies include wikis, blogs, podcasts, social networks, video-sharing sites such as YouTube, and virtual worlds such as Second Life. Educators and researchers can anticipate that new technologies will continue to be introduced, which will require adaptation by both students and instructors, supported by investigation by researchers as to their effectiveness. It is important to look for “clues as to how e-learning technologies can become powerful catalysts for change as well as tools for redesigning our learning and instructional systems” (Shroff & Vogel, 2009, p.60).

The maturing of instructional platforms, also referred to as Learning Management Systems (LMS), is another development in recent DE history. Saadé and Kira (2009) describe LMS as a framework that

includes instructor tools, learning process tools, and a repository of data. Examples of LMS platforms include WebCT, Blackboard, and DesireToLearn, which have emerged as the top three LMS and are pervasive in today's DE environment. Most recently Moodle has emerged as a new LMS open-source system, a free alternative to the aforementioned platforms (Unal & Unal, 2011). It is essential that the tools implemented support the course assignments, activities, and content (Singh, Mangalaraj, & Taneja, 2010; Smart & Cappel, 2006). "Clearly, technology-supported learning environments have the potential to provide tools and structure to transform education" (Shroff & Vogel, 2009, p. 60). The students used in this study have been exposed to Blackboard LMS through which students participate in discussion forums, online journals, Wikis, online testing and practice quizzes, virtual teams, YouTube, and other interactive tools.

In spite of all the technological advances evidenced in recent DE courses and the emphasis universities are now placing on integrating online students into the student community, attrition rates among online education remain high (Haigh, 2007; McLaren, 2004). So who are the students most likely to succeed? In search for this answer, Haigh (2007) investigated student characteristics including gender, study habits, learning styles, learning environment, access to resources, experiences with distance learning, and technology proficiency. Learning style can be defined "as a person's preferred approach to information processing, idea formation, and decision making" (Kalsbeek, 1989, p. 2). In addition to student learning styles, other student characteristics such as age, prior familiarity with higher education, years of computer use, and student preference between individual rather than group work may also be factors in explaining student success in DE. According to Doyle (2009), there are no statistically significant differences between online students and campus-based students in regard to race, ethnicity, or income. However, there are various demographic differences to consider. For example, online students tend to be older than their peers in regular classrooms. An online student is most likely to be over 30, while a regular student will most likely be between 15-23 years of age, and there are more female online students than male students. As students continue to pursue both campus-based and online courses, it is imperative to investigate learning outcomes between these differing platforms (Allen & Seaman, 2010).

In the current climate, many formal education institutions have integrated DE into their curriculum format. While campus-based courses continue, students are increasingly given the option to pursue degrees entirely offered online or supplement the traditional format with online classes (Allen & Seaman, 2010a, 2010b). Considering the proliferation of students seeking courses online, it is essential to investigate student success in online and campus-based platforms. In their comprehensive review, Bekele and Menchaca (2008) suggested relevant research should utilize strong theoretical framework, employ compatible implementation and assessment, and adhere to a clear methodological structure. Although constrained to only online students, Seok, DaCosta, Kinsell, and Tung (2010) suggest that instructional design features require further investigation regarding student learning preferences, along with offering an array of evaluation methods (Kılıç-Çakmak, Karataş, & Ocak, 2009).

The purpose of this study is to explore differences in student perceptions of e-learning tools in online and campus-based courses and to measure the explanatory power of these perceptions in predicting their course grades. The intent of this study is to contribute to the existing literature by including and comparing online and campus-based student performance. In addition, the following discussion of the literature will suggest further exploration among variables from the field of Information Systems: Perceived Usefulness, Perceived Ease of Use, Computer Self-Efficacy, and Computer Anxiety in combination with variables in the Education literature: the ability to work independently variable, and course performance. To begin, a review of the literature on course performance follows.

Course Performance

Student performance in online versus campus-based courses has been the subject of an increasing number of studies. The relevant literature has employed a student's grade as an indicator of course

performance (Brecht & Ogilby, 2008; Buche, Davis, & Vician, 2007; Caspi & Gorsky, 2006; Chyung, 2007; Hiltz & Wellman, 1997; Irani, Telg, Scherler, & Harrington, 2003; Kock, Verville, & Garza, 2007; Loomis, 2000; Manochehri, & Young, 2006; McLaren, 2004; Newlin, Lavooy, & Wang, 2005; Puzziferro, 2008; Rabe-Hemp , Woollen, & Humiston, 2009; Syler, Cegielski, Oswald, & Rainer, 2006). Interestingly, among the studies comparing final course grade differences between online and campus-based students, many have not found the difference to be statistically significant (Benson, Johnson, Taylor, Treat, Shinkareva, & Duncan, 2005; Hiltz & Wellman, 1997; Kock et al., 2007; Manochehri, & Young, 2006; McLaren, 2004; Newlin, et al., 2005; Rabe-Hemp et al., 2009). Notwithstanding this fact, the course final grade is still an important reference in the literature. Kock et al. (2007) conducted an experiment with an introduction to information systems (IS) course that was taught both online and on-campus. Their experiment was longitudinal, including assessments in the midterm point and at the end of the semester. Their instrument included both quantitative measures as indicated by test results and qualitative measures where students answered open-ended questions. The quantitative results showed online students were performing at a significantly lower level than their face-to-face counterparts in the midterm, but the results of the final exams did not show statistically significant differences. The qualitative comparison, which measured the level of ambiguity, cognitive effort, and excitement in the two types of courses, did not reveal any significant differences.

Murthy and Kerr (2004) tested the performance differential of groups using one of three media to problem solve an auditing problem in an accounting course. The three media were face-to-face, chat, and bulletin boards. There were a total of 35 teams, each consisting of four group members. The results showed that the teams using the bulletin board out-performed the others by a wide margin. Of the teams using the bulletin boards, 77% answered both of the case questions correctly compared to 42% of the teams using the chat and 44% using face-to-face communication. The difference in performance between the chat and face-to-face communication was not statistically significant. However, the teams using the bulletin board communication method took longer to arrive at their answers.

Dobbs, Waid, and del Carmen (2009) included student perceptions as a factor that contributes to the explanation of differences in student performance in online courses. Analysis of departmental evaluations indicated that around 30% of students felt that they had learned more in the online class, that it was more intellectually challenging, and that it was more difficult. Student readiness for online courses has been shown to be a significant predictor of student course satisfaction. The student's readiness construct as measured by Dobbs et al. (2009) is composed of items such as a student's general attitudes towards online courses, self-efficacy in prerequisite skills, independent initiative, and desire for interaction.

With the advent of incorporating web-based technology in the classroom, a videoconference format was used to deliver course content. Irani et al. (2003) found that personality type influenced student performance, with introverts exhibiting a positive relationship between only instructional technique perception and grade attainment. Loomis (2000) found that students reporting strong time management skills earned higher grades, suggesting their ability to better direct their studies pursuant with their own schedules. The use of web-based tutorials may indicate that students can achieve higher course grades (Syler et al., 2006). Comparing in-class and online sections, two separate studies found no statistically significant differences between students' final grades (Kock et al., 2007; Newlin et al., 2005).

Student performance in this study was based on multiple assessment measures including exams, discussion, and individual project-based work. Other related research has employed a student's grade as an indicator of course performance. In a meta-analysis of research concerning online education that survey business students, investigators found that early studies were not able to substantiate differences in test performance, and that subsequent studies revealed differences in attitudes toward a medium affected student performance as the semester progressed (Arbaugh, Godfrey, Johnson, Pollack,

Niendorf, & Wresch, 2009). Although many variables have been studied in relationship to student performance, few have looked at it in relation to student acceptance of technology considering both online and campus based students.

Theoretical Background

Fishbein and Ajzen (1975) and Ajzen and Fishbein (1977) proposed that the immediate determinant of behavior is intention, or what they termed behavioral intention. The construct captures motivational factors such as how much effort a person is willing to exert to perform a specific behavior (Ajzen, 1991). The Theory of Reasoned Action (TRA) model suggests that several factors precede behavior, specifically attitudes and subjective norms (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Additionally, the model is based upon two basic assumptions: first, people are rational and, secondly, their social actions are under volitional control. Rational implies that humans use information available to them, and the model is based on the premise that social interactions are largely guided by reasoning and behavior (Ajzen, 1991). Attitude toward a behavior is a favorable or positive evaluation or unfavorable or negative evaluation of performing the behavior. Subjective norm refers to an individual's perception of the social pressures felt either for or against performing a specific behavior, and how one's social circle or those who influence one's decisions view the behavior. In essence, the model assists to explain a person's behavior and is applicable in many fields.

The Technology Acceptance Model (TAM), developed by F. Davis (1986) is a derivative of the TRA model. Specifically, the model supports the investigation of an individual's "determinants of computer usage behavior" (F. Davis, Bagozzi, & Warshaw, 1989, p. 983). Based upon TRA, the TAM was modified and "specifically tailored for modeling user acceptance of information systems" (F. Davis et al., 1989, p. 985). The TAM model infers "that an individual's behavioral intention to use a system is determined by two beliefs: perceived usefulness" and perceived ease of use (Venkatesh & Davis, 2000, p.186-187), the two main components of the model which has been widely used to measure the use of various information technologies and is now being used as a framework to measure the effectiveness of DE (Arbaugh, 2005; Martins & Kellermanns, 2004; Manochehri & Sharif, 2010; Unal & Unal, 2011). Research into the cognitive processes a student undergoes when taking an online class, also referred to as e-learning, is well served by using the models used in IS research.

In this study, e-learning tools are defined as the electronic delivery of learning materials and instruction over the Internet (Welsh et al., 2003). The utilization of discussion forums and chats are examples of e-learning tools (Nam & Smith-Jackson, 2007; Saadé, 2007). In the context of e-learning, a student's likelihood of using a LMS such as Blackboard, for example, or any of the Web 2.0 technologies can be determined by the student's attitude toward using the technology and its perceived ease of use.

Considering this study's focus on e-learning tools and their relationship to student performance in both online and campus-based classes, TAM (F. Davis, 1989) provides insights into how the students' perceptions of various e-learning tools influences students' decisions to take an online or campus-based course. In addition, these perceptions and attitudes play a predictive role on the course grade. In the model, perceptions that a particular technology is useful and easy to use influence students' attitude toward the technology and, consequently, their decision to use it.

Perceived Usefulness and Perceived Ease of Use

F. Davis (1989) argued that it is necessary to provide indicators for "predicting and explaining system use" (p. 319). Perceived Usefulness (PU) is defined as "the extent to which a person believes that using the system will enhance his or her job performance," and Perceived Ease of Use (PEU) is "the extent to which a person believes that using the system will be free of effort" (Venkatesh & Davis, 2000, p.187). Previous research has investigated PU and PEU extensively (Adams, Nelson, & Todd,

1992; Agarwal & Karahanna, 2000; F. Davis, 1989; R. Davis & Wong, 2007; Gibson, Harris, &, Colaric, 2008; Igbaria, Guimaraes, & Davis, 1995; Saadé, 2007; Venkatesh, 2000; Venkatesh & Davis, 2000). F. Davis (1989) is credited with clarifying the variables and found quantifiable "relationships with self-reported measures of usage behavior" (p. 333). Interestingly, the study found users exhibited a willingness to manage difficulty encountered with system usage. Although the construct's relationships are well tested, Adams et al. (1992) found that user experience may influence the association between PEU and usage. The construct was found to have a strong effect on PU and computer usage when considering user training, system quality, and computer experience (Igbaria et al., 1995). Agarwal and Karahanna (2000) reiterated the importance of investigating user response to technology practice, and stress the importance of user perceptions. Training has been found to directly influence user perceptions of technology (Venkatesh, 1999). Furthermore, it is proposed that with the evolution of technology, the value of acknowledging the relevance of user experience on usage intention should be explored. Allowing that PEU is a strong indicator of user acceptance, Venkatesh (2000) highlights the need to contribute to the research regarding the determinants of this construct. The author also suggests the need to enhance technology acceptance by further investigating PEU in light of conditions to improve positive perception, while recognizing the strength of user's perception. For example, students were found to assign a value of usefulness or utility to different course content. Content seen as beneficial, or of high utility, was visited more frequently than support material with no perceived utility such as external references (Landry, Griffeth, & Hartman, 2006; Saadé & Bahli, 2005). The following hypotheses were formulated related to student perceptions of e-learning tools and performance:

H_1: Perceived Ease of Use of e-learning tools will have a statistically significant correlation to the course grade a student will achieve.

H_2: Perceived Usefulness of e-learning tools will have a statistically significant correlation to the course grade a student will achieve.

Computer Self-Efficacy

Self-efficacy is defined as a person's perception regarding his or her ability to successfully execute a behavior required in accomplishing a desired outcome (Bandura, 1977). Researchers have shown the importance of capturing both the magnitude (level of task difficulty) and strength (the confidence placed on attaining the level of task difficulty) dimensions when measuring self-efficacy (Hartwick & Barki, 1994). Bandura and Cervone (1986) further refined the definition as the belief in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet the situational demands.

Compeau and Higgins (1995) review of research concerning the measurement of self-efficacy within the computing context resulted in defining Computer Self-Efficacy (CSE) as "a judgment of one's capability to use a computer" (p. 192). Interestingly, when measuring user support, a negative influence was found because users developed a dependency on the support and were not able to increase their CSE. Concerning PEU and usage, CSE did exhibit a strong relationship, which can be explained as a relationship between confidence and CSE (Gong, Xu, & Yu, 2004). This implies that the easier the system is to use, the greater will be the perceived CSE. Saadé and Kira (2009) found evidence to support the important mediating role of CSE in student usage of LMS. They conclude that positive learning usage increases with ease of use. Therefore, close attention must be paid to providing simple, interactive, and familiar features in the course design in online courses.

Martins & Kellermanns (2004) assessed business students' self-efficacy of using the web and its relationship to PEU. Furthermore, CSE is a dynamic construct and reflects more than ability assessment; it forms a critical influence on future intentions. Students with greater feelings of preparedness report a strong relationship with CSE (Mykytyn, Pearson, Paul, & Mykytyn, 2008). When measuring stu-

dent learning, there was a strong relationship found with CSE (Simmering, Posey, & Piccoli, 2009), which strengthens the belief in confidence in personal abilities assists with knowledge acquisition. Due to the proliferation of technology usage, there is value in continued investigation of CSE's role among computer users (Marakas, Yi, & Johnson, 1998). Furthermore, as previous studies are mostly limited to a single academic course, the inclusion of additional academic disciplines in a single study is suggested (Gong et al., 2004). Lastly, Puzziferro (2008) did not find a correlation between online self-efficacy and student performance, which necessitates further exploration into the relationship. Thus, the following hypothesis was formulated for this study:

H_3: Computer Self- Efficacy will have a statistically significant correlation to the course grade a student will achieve.

Computer Anxiety

According to Bandura (1977), there are four primary antecedents for self-efficacy judgments, the most important of which is emotional arousal. Emotional arousal is tied to computer anxiety, and computer phobia and high levels of arousal are associated with reduced computer performance. There is a cycle of anxiety in a computer setting that increases resistance or even fear toward computers (Marakas et al., 1998). Anticipatory self-arousal (Bandura, 1977) needs to be controlled through direct anxiety-reducing mechanisms.

Computer Anxiety (CA) is defined as the inclination of an individual to have a negative reaction while considering computer usage (Howard & Smith, 1986; Saadé & Kira, 2009). The relevance of investigating the attitude toward computer usage is underpinned by Fishbein and Ajzen (1975), who suggest that feelings for an object may impact response. In fact, CA was found to negatively affect the attitude toward using computer technology (Igbaria & Parasuraman, 1989). From these findings, it was suggested that CA might be decreased with appropriate educational training. An individual's system experience can play an important role in computer usage. Recent studies suggest that an individual's CA could be lowered with positive system experience and not just mere exposure to technology (Hackbarth, Grover, & Yi, 2003; Buche et al., 2007). Several studies have investigated the relationship between self-efficacy and CA. Compeau and Higgins (1995) suggested that self-efficacy influences an individual's feelings. More specifically, Saade and Kira (2009) found that those users exhibiting high self-efficacy experienced less CA; therefore, it follows that as CA increases, PEU decreases (Saadé & Kira, 2009). Furthermore, CA was found to have a negative relationship to performance related outcomes (Compeau, Higgins, & Huff, 1999). Buche et al. (2007) wisely point to the fact that even though our society uses technology ubiquitously, our "contemporary subjects" are still faced with CA and that the need to study the relationship between CA and performance has become even more important. Therefore, the following hypothesis was formulated to explore the relationship between performance and CA:

H_4: Computer Anxiety will have a statistically significant correlation to the course grade a student will achieve.

Ability to Work Independently (WORK)

A substantial research stream within the education literature has sought to explain whether the difference in dispositions towards a particular instructional method can be considered a learning preference or style. Are there differences between students who chose the traditional lecture learning environment and the online environment? Specifically, are there differences in student perceptions, skills, and aptitudes that lead them to choose an online environment over the campus-based environment? Are these differences in perceptions, skills, and aptitudes a contributing factor to explaining student performance as the final course grade?

The ability for students to coordinate their study time has been investigated (Loomis, 2000; Rabe-Hemp et al. 2009; Syler et al., 2006). A fundamental component of student success is course preparation and study. A study conducted by Rabe-Hemp et al. (2009) found that online students reported more time allocated to class preparation activities than campus-based students. In addition, to assist student success online courses should communicate the necessity of time management (Calvin & Freeburg, 2010; Puzziferro, 2008). This suggests that successful students manage their course preparation according to their personal schedule, instead of attending physical class times (Loomis, 2000).

Online courses and e-learning tools create learning situations where students are more responsible for their own learning. Thus, online courses and the use of e-learning tools engage students in the learning process that Knowles (1975) described as participating in self-directed inquiry and Candy (1991) characterized as learning with predominant learner control. Generally recognized for revisiting the term *andragogy*, Knowles (1980) began early to use the terms *self-directed learning* and *self-directed inquiry* in his writings related to adult learning. A student's ability to work independently is embodied in this idea of self-directed or self-regulated learning (Manochehri & Sharif, 2010; Shroff & Vogel, 2009; Smart & Cappel, 2006). Considered a pre-entry requirement for enrolling in an online course, a student characteristic associated with online success, or sometimes referred to a student success factor or a learning style preference, the ability to work independently has been studied in relationship to student online learning adaptation and success (Artino, 2009; Hung, Chou, Chen & Own, 2010; Shinkareva & Benson, 2007; Smith, Murphy & Mahoney, 2003). The ability to work independently (WORK), therefore, is defined as "self-management of studies by working on one's own initiative where a student takes more responsibility for his or her own learning" (Manochehri & Sharif, 2010, p. 36). The authors elaborate that technology has the opportunity to enhance WORK with its speed and ubiquitous accessibility, allowing for individualized instruction (Manochehri & Sharif, 2010).

Many university DE departments provide students with the opportunity to self-assess their readiness for online learning via survey instruments. Student ability to work independently and other factors such as academic and life skills and course expectations are incorporated into such assessments. Haigh (2007) reviewed several universities' DE student self-assessments to create questions to help capture the notion of student self-sufficiency or ability to work independently and measured this in a study profiling online and face-to-face information science students. Thereby, the inclination towards our final hypothesis was formulated and worded as follows:

H_5: The Ability to Work Independently will have a statistically significant correlation to the course grade a student will achieve.

Methods

Bernard et al., (2009) conducted a meta-analysis of the DE literature and concluded that "studies in which instructional and other treatments are administered on a roughly equal footing" (p. 1245) provide a better method of examining the effect of learning tools. Therefore, data for this study were collected from students pursuing a Bachelors of Business Administration, who were given the choice of enrolling in either the online section or campus-based classroom section of the same course during the Fall Semester of 2009. The same instructor offered the pair of class sections simultaneously with almost identical materials and requirements. The paired classes included Information Systems in Organizations (IS), Human Resource Management (HRM), and International Management (INTL). University policy encourages the use of Blackboard as an instructional platform for all students, including campus-based students. As such, all students who participated in the study used Blackboard regularly during the semester. Surveys were administered through Blackboard to all students in the IS, HRM, and INTL sections. Students were invited to participate with an offer to received extra points for their participation, as done by Mykytyn et al. (2008). The questionnaire was made available to the students, who could answer it at their convenience, during the last two weeks of the semester.

Representing a response rate of 71%, there were 141 completed surveys. There were 198 students enrolled when the invitations to participate were sent. The composition of responses was divided into 50% on-line students, and 50% from campus-based students.

The course syllabus, schedule, PowerPoint presentations, videos, and other reference materials are available in Blackboard 24 hours a day for the 7 days of the week to all students. The e-learning tools used in these classes were tools associated with Blackboard, which include discussion board, videos, examinations, quizzes, and Tegrity, as well as other web-based tools such as Calibrated Peer Review (CPR) and on-line ethics simulations. Tegrity is a flexible software tool that can capture audio, video, and computer screen activity into one single "session" which is automatically uploaded and then can be linked to a Blackboard course. CPR is a web-based program that allows instructors to incorporate frequent writing assignments into their courses, regardless of class size. The CPR system manages the peer-review process, including electronic paper submission, student training in reviewing, student input analysis, and final performance report preparation. In advance, the instructor creates the assignments and rubrics for reviewing which can be stored for current and future course use.

Instrument Development

The questionnaire in the survey used scales found in both the IS and Education literature forming a set of 54 questions. Using TAM, PU, and PEU are the first two constructs measured in this study. PU refers to a person's perception of how the adoption of a new technology will increase the efficiency of the person's performance in accomplishing a certain task. This is captured by the question, "I feel that online learning is at least of equal quality to traditional classroom learning" (Haigh, 2007, p. 99). Measured by a scale used by Saadé and Kira (2009), PEU is a person's perception of how easy the technology will be to use (Venkatesh, 2000). The less perceived effort, the easier the technology will be to adopt (F. Davis et al., 1989). Questions regarding the PEU of the course technologies and automated learning tools were adapted from Saadé and Kira (2009). A third construct used in this study, and also used in the Haigh study, concerns the ability of the student to work independently (WORK). The fourth and fifth constructs, CSE and CA, use scales from Saadé and Kira (2009).

Instrument Validation

The scaled constructs used in this study are presented in Table 1 along with their corresponding alpha coefficients.

Table 1: Reliability Assessment

Variable	Cronbach Alpha	Mean	Standard Deviation
Computer Self Efficacy (CSE)	.905	14.25	5.827
Perceived Ease of Use (PEU)	.874	15.97	3.458
Ability to Work Independently (WORK)	.775	17.67	2.646
Computer Anxiety (CA)	.842	5.51	3.176

Table 2 shows the factor loadings for the four latent variables used in the study, namely, CSE, PEU, WORK, and CA. The factor loadings were calculated using the principal component extraction method. To decrease factor cross-loadings and increase discriminant validity, the factors were rotated using the varimax rotation method with Kaiser Normalization. All loadings below .30 were suppressed. Convergent validity was also achieved as evident by the high loadings on the questions corresponding constructs. The total variance explained with the four factors was 71.203%. The Kaiser Sampling Adequacy Score was .769, and the factor scores were saved as variables using the Bartlett method.

Table 2: Factor Analysis Rotated with Varimax with Kaiser Normalization

Item	CSE	PEU	WORK	CA
Before the course started, I thought learning to navigate the on-line course components would be easy for me.[a]		0.792		
Before the course started, I thought I would find it easy to get the online course components to do what I wanted.[a]		0.857		
Before the course started, I thought it would be easy for me to become skillful at using the on-line course components.[a]		0.881		
Before the course started, I thoughtI would find the on-line course easy to use.[a]		0.853		
Before the course started, I thought I could complete the required tasks using learning tools only if I had seen someone else using it before trying it myself.[a]	0.813			
Before the course started, I thought I could complete the required tasks using learning tools only if I could call someone for help when I got stuck.[a]	0.882			
Before the course started, I thought I could complete the required tasks using learning tools only if someone else had helped me get started.[a]	0.863			
Before the course started, I thought I could complete the required tasks using learning tools if I had a lot of time to complete the task for which the learning tool was provided.[a]	0.763			
Before the course started, I thought I could complete the required tasks using learning tools only if someone else showed me how to do it first.[a]	0.851			
It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.[a]				0.76
I hesitate to use a computer for fear of making mistakes I cannot correct.[a]				0.906
Computers are somewhat intimidating to me.[a]				0.881
I am able to easily access the Internet as needed for my studies.[a]			0.739	
I am able to work independently.[a]			0.766	
I am self motivated and self disciplined.[a]			0.766	
I can usually figure out what to do in an assignment by reading and following the instructions.[a]			0.777	

[a] Strongly Disagree, Slightly Disagree, Neutral, Slightly Agree, Strongly Agree

All scores below .30 were supressed.

Findings

Differences between Online and Campus-based Classes

Initially, student performance between online and campus-based students was analyzed for statistically significant differences with the use of independent sample T-tests. The literature points to maintaining a longitudinal assessment of performance outcomes throughout the semester; therefore, various performance measures were collected, as shown in Table 3.

Table 3: Performance Measures

Course	n		Final Exam		Midterm		Discussion		Project		Course Grade	
	Campus-based	On-line	Campus-based	On-line	Campus-based	On-line	Campus-based	On-line	Campus-based	On-line	Campus-based	On-line
IS	38/44	25/37	72	89	78	74	91	79	79	64	81	80
HRM	16/25	24/40	71	81	79	80	88	97	79	86	84	84
INTL	16/17	22/35	88	90	85	82	94	88	90	84	87	85

The course grade is, of course, the most important assessment indicator as it averages all other performance measures. The Final Exam and Project are end-of-semester measures, while the Midterm indicates performance approximately the eighth week of the semester. It is important to note that the Project grade is not a group project, but one completed individually. Furthermore, one discussion grade was collected. This assignment was completed using Blackboard Discussion Forums where students were asked to provide their own posting as well as give feedback to at least one of their classmates. The results, shown in Table 4, were surprising. The course grade averages as noted in Table 4 were quite similar, notwithstanding the differences in other measures. Campus-based students on average performed better on projects and discussion boards, while online students performed better on the final. Contrary to findings in the literature review, the Midterm grade averages in this study were very similar. The only statistically significant difference, however, was found in the Final Exam scores.

Table 4: Differences between online and campus-based student performance

Performance Measure	t-score	Sig 2-tail	Mean Difference	Mean Classroom	Mean Online
Course Grade	-0.128	0.898	-0.201	82.70	82.90
Final Exam	-5.685	0.000**	-10.101	75.54	86.69
Midterm	0.574	0.567	1.196	79.91	78.72
Discussion	0.729	0.467	2.743	90.76	88.01
Project	1.039	0.301	3.740	81.56	77.82

** Significant at .01 level

Secondly, independent sample T-tests were performed on all questions comparing the mean scores of the online students with the campus-based students. Using the case-by-case analysis for missing values, the questions that had statistically significant differences are shown in Table 5. The t-score, significance, mean difference, and mean scores are shown. Interestingly, the results indicate that online students tended to be more confident about their typing skills than in-classroom students. Online students were also more comfortable with written communication than their counterparts in the classroom environment. The campus-based students disagreed that online learning was of equal quality with campus-based classroom learning. Reaction to the statement of being apprehensive towards computers was also statistically significantly different. Online students tended to disagree with this statement, while campus-based students tended to be neutral towards the statement. Before the course started, online students thought that online courses would be easy to use to a higher degree than campus-based students.

Table 5: Differences between online and campus-based student perceptions

Question	t-score	Sig 2-tail	Mean Difference	Mean Campus-based	Mean Online
I have good typing skills.[a]	-1.882	0.062	-0.292	4.14	4.44
I need assistance to understand text I read.[a]	1.813	0.072	0.419	2.71	2.30
I rarely ask for help when I need it. [a]	1.841	0.068	0.383	3.19	2.80
I put things off until the last minute. [a]	1.668	0.098	0.357	3.49	3.13
I feel online learning is at least of equal quality than traditional classroom learning. [a]	-2.377	0.019	-0.523	2.86	3.38
I feel apprehensive about using computers. [a]	2.759	0.007	0.659	2.81	2.15
Before this course started, I thought I would find on-line courses easy to use. [a]	-1.808	0.073	-0.326	3.89	4.21
Before this course started, I thought I could complete the required tasks using learning tools only if I had seen someone else using it before trying it myself. [a]	1.655	0.100	0.382	3.11	2.73
Did you attend tutorial sessions? [b]	2.246	0.026	0.100	0.13	0.03
Rate the course in level of difficulty. [c]	-2.099	0.038	-0.197	3.00	3.20

[a] Strongly Disagree, Slightly Disagree, Neutral, Slightly Agree, Strongly Agree

[b] No, Yes

[c] Very Easy, Easy, Moderate, Difficult, Very Difficult

Participants Demographics

The respondent demographics are shown in Table 6 and coincide with the findings presented in the literature. Parsad and Lewis (2008) indicated that there were more female online students than males students, and though this is true in this study, the difference is very slight: 52% of the 71 online student respondents were female and 48% were male. This statistic is comparable with the campus-based statistic. With regard to age, there are a higher percentage of students older than 24 years old in the online class compared to the traditional undergraduate age group of under 24 years old. Two-thirds of the online students are over the typical age compared to 57% of the campus-based students being of typical age in our university. Recent findings of the Department of Education have found that online students most typically live within the city-limits of the university (Parsad & Lewis 2008). This was also the case in this study where 60% of the online students lived within the city limits, 37% within a 60-mile range and only 2.8% live far from the university.

Table 6: Student Demographics

	Online	Campus-Based	Total
Gender			
Female	**52.1%**	**52.9%**	**52.5%**
Male	**47.9%**	**47.1%**	**47.5%**
Age			
Typical (under 24)	**39.4%**	**57.1%**	**48.2%**
24-30 years old	**42.3%**	**31.4%**	**36.9%**
Older than 30 yrs old	**18.3%**	**11.4%**	**14.9%**
City of Residence			
In-City	**60.6%**	**67.1%**	**63.8%**
Near – within 60	**36.6%**	**28.6%**	**31.9%**
Beyond 60 miles	**2.8%**	**4.3%**	**3.5%**

Correlations

Before initiating the regression analysis, a correlation test was run among the variables. The results, shown in Table 7, give an initial indication of the strength of the variables relationships. There was no correlation between the predictor variables CSE, PEU, WORK, or CA and, as is demonstrated by factor analysis, these are independent constructs. PU was slightly correlated with the rest of the variables, but none were found statistically significant, except for the Online Total variable, which indicates the number of online classes a student has taken. Noticeably, there are statistically significant correlations between course grade, PEU, and WORK. The age variable was found to be negatively correlated with course grade at a statically significant level of .05

Table 7: Correlations

Variable	1	2	3	4	5	6	7	8
1. CSE	1							
2. PEU	.000	1						
3. PU	-.072	.111	1					
4. WORK	.000	.000	.031	1				
5. CA	.000	.000	.062	.000	1			
6. Course Grade	-.063	.309**	-.134	.286**	.036	1		
7. Age	-.055	-.096	.013	-.191*	.095	-.241**	1	
8. Online Total	-.135	.024	.184*	-.044	-.078	-.008	.176*	1

*Correlation is significant at .05 level

** Correlation is significant at .01 level

Regression

Regression analysis was used to test the hypotheses, with PU, PUE, CSE, CA, and WORK as the independent variables and Course Grade as the dependent variable. As shown in Table 8, the regression model revealed that there was evidence to support the hypotheses that PEU (H_1), PU (H_2) and the WORK (H_5) were statistically significant contributors to the final course grade. However, we did not find evidence to support the hypotheses that CSE (H_3) or CA (H_4) played a statistically significant role in predicting the final course grade.

Table 8: Regression of Course Grade

	Regression Model								
Variable	B	Standard Error	β	t Stat	p Value	R^2	Adj R^2	R^2 change	F
PEU	3.115	0.713	0.334	4.371	0.000	0.101	0.095	0.101	15.354
WORK	2.458	0.709	0.266	3.465	0.001	0.183	0.171	0.082	13.535
PU	-1.451	0.542	-0.203	-2.675	0.008	0.226	0.208	0.042	7.315
Age	-0.209	0.106	-0.152	-1.979	0.050	0.248	0.225	0.022	3.915
CSE	-0.072			-0.950	0.344				
CA	0.056			0.734	0.464				

Discussion and Practical Implications

The purpose of this study was to investigate the roles that PU, PEU, CSE, CA, and WORK, in the context of a LMS, play in predicting student performance in online and campus-based classes in three business disciplines. Regression analysis demonstrated that PU, PEU, and WORK were shown to be indeed related to final course grades, thus supporting H1, H2, and H5, suggesting that e-learning tools, as well as WORK, do play an important role in performance in both online and campus-based courses. The statistically significant relationship between the PU and PEU variables from TAM in courses delivered online and on-campus related to e-learning tools and WORK indicates that as these increase, final grades increase. The findings demonstrate the contribution value of PU and PEU for campus-based classes using e-learning tools. This has implications for campus-based courses in particular, suggesting that e-learning tools be considered in their design. This implies that this skill, often thought to be more important for students taking online courses, is equally important to campus-based courses employing e-learning tools and that universities and colleges may want to provide self assessments of this skill to all students, not just students enrolling in online courses.

Online education has created an influx of students for universities and colleges that is both encouraging and challenging as this method of instruction is subject to questions regarding the effectiveness of the technological systems and practices of the institution and the instructors (Gibson et al., 2008). Considering these questions, the findings of this study, in addition to its primary finding related to the hypotheses tested, revealed that there are a statistically significant number of students who do not believe that online courses are equal in value compared to those delivered on-campus. This is evident by the negative sign seen in the PU variable in the Course Grade equation found in Table 8. This finding coincides with the literature suggesting that student perceptions of the usefulness and effectiveness of the online instructional format has a statistically significant effect on the emotional processes and learning the student experiences (Dobbs et al., 2009; Moneta & Kekkonen-Moneta, 2007). Given the perception that online courses do not have the same value as campus-based courses, it is incumbent upon universities to reinforce to students that, although different, properly designed online courses provide the same content and are subject to the same assurance of learning standards as campus-based courses and, at the same time, provide students with a better understanding of their learning preferences via self-assessments related to online learning. "In terms of teaching and learning, having a usable course management system [or learning management system] means potentially reducing teacher time invested in setting up and managing the course and improving the student's learning experience" (Unal & Unal, 2011, p. 21). However, it is also true that "course designs that haphazardly integrated a variety of features" (p. 21) hindered student learning because the design did not reinforce course objectives or satisfy student expectations (Unal & Unal, 2011).

Although CSE did not contribute with statistical significance to the regression equation when predicting the final course grade, this study revealed statistically significant differences in CSE between online and campus-based students. Online students perceived they had not only better typing skills but also better written communication skills. Online students reacted negatively to the statement "I feel apprehensive about using computers," in contrast to the neutral reaction of campus-based students. Ng, Yeung, and Hon (2006) state that it seems logical that students who are less skilled will have more anxiety that will lessen their enjoyment of a DE course. Grant, Malloy, and Murphy (2009) call attention to the fact the comprehension, level of skill, and self-efficacy a student possesses of a particular computer software or e-learning tool is continuously changing, emphasizing the need for continuous measurement of these factors and subsequent adaptation or realignment of course content and methodologies. Similarly, Wan, Wang, and Haggerty (2008) conclude, "pretests could be designed to help learners assess their own levels of virtual competence, and thus make the proper choice [online vs. campus-based courses]" (p. 519).

An important development in university education is that more often than not, the online student is also a student attending campus-based courses. This rather recent development has led universities to consider developing hybrid courses (Kock et al., 2007; Ng et al., 2006) to maximize university resources and provide flexible schedules for student convenience. Only a small percentage of students would not be able to be on campus to attend a hybrid schedule. Hybrid courses, because they employ e-learning tools, have a higher potential to improve student PU and PEU and to exert less pressure on a student to work independently. At the same time, hybrid courses may be more acceptable to students and instructors who believe that online instruction is not as valuable as campus-based instruction or those that need encouragement to adapt or increase usage of technology.

In this study, as part of the data collection process, in addition to measuring student perceptions of e-learning tools, students were given an opportunity to provide commentary and suggestions on how to improve their courses. A content analysis of the comments section revealed that students expect the instructor to provide a strict schedule for online courses and said they prefer weekly assignments and weekly quizzes rather than having an extended period of time, such as one or two months, to submit assignments. Students reported that they enjoy quick feedback and mentioned that they can tell when an instructor does not want to be bothered by online students. Also related to feedback, some online students suggested that a monthly meeting with the instructor be scheduled for each student. According to Kock et al. (2007) and Shroff &Vogel (2009), online learners may require more positive feedback when they are doing well on assignments throughout the course of the online course, which may lead to higher self-efficacy and translate into high learning outcomes. "Feedback, building on assessment, allows students to gauge their progress, consider alternate learning strategies, and project their own continued learning needs" (Bonnel, 2008, p. 290). Though generally it is understood that frequent feedback from the instructor encourages students, they also benefit from peer feedback and interaction with the course material (Bonnel, 2008; Kellog & Smith, 2009). Kellogg and Smith (2009) found that adult online students learned the most from interaction with course material and to a lesser extent from interactions with the instructor; yet our study found that adult online students wanted interaction with the instructor.

Ng et al. (2006) insist that peer interaction must be encouraged and suggest that online instructors create pairs of online buddies. A frequently used e-learning tool that facilitates peer interaction and stimulates student-to student exchange of ideas and information is the discussion board. In this study, students reported they enjoyed the use of video clips tied to discussion boards, which required them to interact with other students. Kellog and Smith (2009) found, however, that adult learners were very critical of group work in their online classes and seemed to indicate that peer interaction was the activity that provided the least learning opportunities. Although students may enjoy discussion boards for exchange of ideas, there is little data to support that students deepen their analytical skills through

this process (Miers, Clarke, Pollard, Rickaby, Thomas & Turtle, 2007). Nevertheless, this does not mean that students' cognitive skills are not supported by the discussion board exchange.

Among the e-learning tools mentioned specifically by the students in this study was the use of CPR, which they enjoyed. A few students asked for Tegrity, which is software that captures audio, video, and computer screen activity in one session, as well as the use of added online tutorials. There was agreement among online students in favor of increased time limits to complete tests, online quizzes and/or exams because they say there was simply not enough allotted time. Many online instructors restrict the time a student has to finish these exams. Authors have pointed toward better content development and use of LMS tools that result in a better effort to fully engage the student. The increased student engagement can be accomplished through "regular site updates, more online assessment opportunities, and module consistency in terms of site content" and will most probably transfer to better student motivation (Love & Fry, 2006, p. 163). Love and Fry call for a university-wide policy for consistent DE course templates. In this manner, a student can learn to navigate the LMS with great ease.

Notwithstanding the differences in student perception, this study did not find any statistically significant difference between the final grades of the two groups, thereby indicating that students were able to attain the course learning objectives at an equivalent level in both online and campus-based sections using similar e-learning tools. This is consistent with the findings in the literature (Benson et al., 2005; Kock et al., 2007). Kock et al. suggest, "that the perceived differences in ambiguity and grades throughout a course may become insignificant toward the end of the semester" (p. 350). Interestingly, the belief that online instruction is inferior to campus-based instruction was not supported by the findings of this study. This could encourage students to change their perceptions that online instruction is inferior to campus-based instruction. This study was not concerned with finding a difference in performance between online and campus-based courses but aimed to explore the effects of e-learning tools on performance. It established that perceptions of the PU and PEU of e-learning tools in both types of classes predicted performance along with the students' ability to work independently. It is important to reiterate that this study controlled for course instructor, course material, and semester by comparing different sections of the same class, answering the concern raised by Lou et al. (2006) that materials equivalence, instructor equivalence, and class size may moderate the results.

Limitations and Future Research

This study was limited to one campus where the student population is primarily Hispanic; therefore, results may not be generalizable to a more culturally diverse population. Additional research that includes other minority groups and/or more diverse groups of students may provide more insight into various e-learning tools and their relationship to performance. However, despite the sample being comprised mainly of one cultural background, the sample included students with various majors including Accounting, Computer Science, Entrepreneurship, International Business, Management, and Marketing. There is evidence in the literature that suggests that older students are more self-directed and therefore more apt to succeed in DE courses (Dobbs et al., 2009); however, we found that age negatively correlates with course grade.

Particular care was given to collect data from courses where students could select courses in which the same instructor taught both online and on-campus, therefore, controlling for the instructor. In addition, we limited the sample to instructors who kept both of these sections as similar as possible, using the same text and almost identical course content. We thought these elements were important to control, although we realized this would limit the sample size and the small sample size could be considered a limitation of this research study.

Although grades were the performance measure used in this study, other outcome measures such as course satisfaction, as done by Artino (2009), could be studied separately or integrated with grades

into future research, thus, providing a well-rounded, richer study. Another area for future research, as Ng et al. (2006) suggest, is implementing testing before and after a student participates in a course with e-learning tools to measure the differential gains of student perception of e-learning tools. A final suggestion for future research is to investigate the effectiveness of hybrid courses to determine the best combination of campus-based versus DE interactions. Several authors suggest that the campus-based interactions should be more numerous at the beginning of the semester than towards the end of the semester (Love & Fry, 2006; Ng et al., 2006).

Researchers recognize that empirical evidence is imperative in guiding our quest to find the best answers to questions related to DE, e-learning tools, and their relationship to student performance. We should not, however, lose sight of the fact that we are researching questions that potentially have profound effects on students' lives and ultimately society. Research related to student learning is profound. What needs to remain central to our quest for knowledge related to e-learning tools are our students and how learning environments provided by such tools improve student performance. Our study findings have contributed to the growing knowledge base related to DE and also support our teaching activities, providing potentially richer, more meaningful learning experiences that will improve learning outcomes for our students.

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