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Full Length Research paper

College students' perception of e-learning and face-to-face learning

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This study examines college students' perception of e-learning and face-to-face learning. We also investigate the antecedents of student's satisfaction and academic performance. Using a structural equation modeling framework, we found that cognitive control, perceived usefulness, course flexibility, classroom interaction, student's characteristics and effectiveness of online learning influenced student's satisfaction. In addition, general self-efficacy and student's engagement predicted academic performance in our model. The authors of the study also discuss the implications, limitations, and future research directions.

Key words: College students, perception, e-learning, face-to-face learning, academic performance.

INTRODUCTION

Distance education has been in existence for more than 100 years (Wang and Liu, 2003). In the early days, correspondence by mail was the medium of communication used to exchange information between students and instructors. With the advent of the internet, the potential of e-learning has grown, and there are few colleges and universities that do not offer e-learning courses in the United States. Several studies suggest that no significant differences should be expected regarding the effectiveness of e-learning compared with the traditional face-to-face learning (Clark, 1983; Russell, 1999). However, there are factors such as classroom interaction that may have a greater influence on students in an e-learning environment when compared to the traditional face-to-face learning.

This study examines the influence of general self-efficacy, academic motivation, student's engagement, cognitive control, student's characteristics, perceived usefulness, perceived ease of use, effectiveness of online learning, classroom interaction, and course flexibility on academic performance and student's satisfaction using a structural equation model.

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LITERATURE REVIEW

Prior researches did not find traditional face-to-face instruction to be superior in the areas of student's performance or satisfaction over e-learning instruction (Allen et al., 2002; Buckley, 2003). However, Smith and Hardaker (2000) advanced that factors such as interaction in e-learning instruction may promote student-centered learning, encourage wider student's participation, and produce more in-depth and reasoned discussions than traditional face-to-face instruction. Although, no significant difference was found between e-learning and face-to-face learning, some factors may have a greater influence on student's performance and satisfaction in one learning environment as compared to the other.

We argue that self-efficacy will influence both academic performance and student's satisfaction. Bandura (1986) defined self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance". An individual's perceived self-efficacy impacts how a person can cope with challenging or adverse events. That is, how efficaciously that person can perform a task to attain a certain goal.

Further, Bandura (1997) and Schwarzer (1992) advanced that a strong sense of personal efficacy is related to better health, higher achievement, and better

social interaction. Schroder et al. (1998) found that high general self-efficacy individuals with cardiovascular issues recovered faster and had a better life a year after their surgery compared to those with low general self-efficacy. In extending self-efficacy to student's behavior, Luthans (2002) found that "the more confident the individual, the more likely the choice will be made to pursue the task and welcome the challenge". Therefore, it can be argued that a person with a high level of self-efficacy will have an optimistic attitude when facing a challenging task.

The academic motivation of a student is expected to influence both performance and satisfaction. Deci and Ryan (1985) found that motivation is related to various educational outcomes, such as curiosity, persistence, learning, and performance. When a person is motivated about doing a specific task, the individual dedicates much time to accomplish that task. Finding the driving force to achieve a desired outcome can come with the simple desire to learn or accomplish a task or to gain a reward. While some students believe that they are responsible for their own success, others think that external factors guide their decisions. According to Vallerand et al. (1992), students' amotivation occurs when they do not perceive contingencies between outcomes and their own actions; they do not understand why they are going to school, and consider going to school a waste of time. To have a better understanding of academic motivation, academic educators have to investigate and determine the forces that influence students to better assist them in increasing their satisfaction in school and improving academic performance.

Astin (1993) found that the time and energy students devote to educationally purposeful activities is the greatest predictor of their cognitive and personal development. Engagement or involvement does not only mean the physical presence of a student in a classroom, but participating in classroom discussions or asking questions to have a better understanding of a topic. Apparently, some students are more engaged in some courses as compared to others. Chickering and Gamson (1987) discovered that student's engagement is stimulated by the following factors: classroom environment, student-to-student relationship, student-to-instructor cooperation, and the effectiveness of teaching. "Because individual effort and involvement are the critical determinants of impact, institutions should focus on the ways they can shape their academic, interpersonal, and extracurricular offerings to encourage student's engagement" (Pascarella and Terenzini, 2005).

We believe that cognitive control influences performance and satisfaction. Cognitive control refers to the information-processing habits or control systems that learners bring to learning situations (Curry, 1991). Several scholars have studied individual learning differences. Kolb (1984), through his experiential learning theory, operationalized cognitive control as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience". Experiential learning theory finds its origins from Dewey's (1938) philosophy of experiential continuum, Lewin's (1951) concept of life space, and Piaget's (1971) theory of cognitive constructivism. The Kolb's experiential learning theory was designed to assist individuals by determining their learning style preferences. For instance, some students learn by visualizing or reflecting while others learn by acting or hearing. Therefore, knowing individuals' learning style may help professors to assist students in becoming more effective learners. Kolb's learning style inventory (1984) has been divided into four categories according to one's abilities: concrete experience, abstract conceptualization, reflective observation, and active experimentation. Each student has unique strengths and weaknesses regarding those abilities; examining the learning style of student's learning style preferences may facilitate student adaptability to different learning environments, namely, taking classes online and having the same satisfaction and academic performance as compared to the traditional learning methods.

Wools et al. (2002) found that student's success in an e-learning environment depends on several interrelated factors: technology, course materials, and the personal characteristics of students. When students are not afraid of the complexity of using computers, the result is more satisfied and effective learners (Piccoli et al., 2001). In addition, Hannafin and Cole (1983) suggest that attitude influences learning interest. Therefore, the personal characteristics of students such as their computer skills, discipline, past e-learning experience, and their attitude toward e-learning may determine whether a student is capable of being successful in e-learning.

As stated previously, computer competency is essential to successfully engaging e-learning. Computer skills or information technology competence is paramount to those students contemplating e-learning (Hannafin and Cole, 1983). The Technology Acceptance Model (TAM) introduced by Davis (1986) is concerned with a user's acceptance or rejection of information technology. The TAM was specifically developed with the primary aim of identifying the determinants involved in computer acceptance in general; secondly, to examine a variety of information technology usage behaviors; and thirdly, to provide a parsimonious theoretical explanatory model (Davis et al., 1989). Two theoretical constructs have been determined to be good predictors of system use: perceived usefulness and perceived ease of use. Davis (1989) defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance," and perceived ease of use as "the degree to which a person believes that using a particular system would be free from effort". Therefore, the usefulness and ease of use of a

particular technology such as a blackboard learning system in the context of e-learning may influence attitude toward e-learning and student's satisfaction as well as academic performance.

The rising demand and growing consumer experience with flexible education programs to support career development and lifelong learning has increased the expectations of students for quality instruction, effective educational outcomes, and finally satisfaction for e-learning (DeBourgh, 1999). So, students are expecting more from their e-learning experiences. Mungania (2003) found that organization, self-efficacy, computer competence, and computer training are key factors that influence the learning experience of students.

Hrastinski (2008) defined online interaction or participation as "a process of learning by taking part and maintaining relations with others, a complex process comprising doing, communicating, thinking, feeling and belonging, which occur both online and offline". Arbaugh (2000b) postulated that the best pedagogical teaching style for Internet courses was an interactive one. For instance, Shea et al. (2001) found that the greater the percentage of the course grade that was based on discussion, the more satisfied the students were, the more they thought they learned from the course, and the more interaction they thought they had with the instructor and with their peers. Therefore, increasing or encouraging student and instructor interaction, which is one of the biggest challenges of e-learning, could improve student's satisfaction toward the e-learning environment.

Online courses offer much flexibility in terms of time and place compared to traditional courses. In the past, students had to attend classes at a specific time. Previous studies showed that students' preference for online courses is strongly correlated with course flexibility (Harasim, 1990). By removing the time and place barriers in online learning, students can freely decide when and where to access their online courses. Many non-traditional students who work full-time perceive e-learning flexibility as being very attractive because it allows them a good work-school balance. While enabling students to continue their education, e-learning also provides students the opportunity to increase their knowledge and skills without giving up jobs, leaving home, or losing income (Tesone and Ricci, 2003). Therefore, we expect that e-learning course flexibility will influence student's satisfaction as well as academic performance in e-learning environment.

Student's satisfaction with e-learning takes into account many factors. Woo and Kimmick (2000) found no significant difference in overall student's satisfaction when comparing e-learning instruction versus the traditional face-to-face learning environment. However, some factors may have a greater impact on student's satisfaction in e-learning compared to face-to-face learning. For instance, DeBourgh (2003) found that student-instructor interaction influenced student's satisfaction. Arbaugh (2001) found that course flexibility was a significant predictor of student's satisfaction. Therefore, the factors of the e-learning environment may influence student's satisfaction.

RESEARCH QUESTIONS

RQ1: Will general self-efficacy, academic motivation, student's engagement, cognitive control, student's characteristics, perceived usefulness, perceived ease of use, effectiveness of online learning, course flexibility, and classroom interaction influence academic performance?

RQ2: Will general self-efficacy, academic motivation, student's engagement, cognitive control, student's characteristics, perceived usefulness, perceived ease of use, effectiveness of online learning, classroom interaction, and course flexibility influence student's satisfaction?

MATERIALS AND METHODS

Sample and procedures

The participants were 203 students at a comprehensive historically black university in the southern part of the United States. The respondents completed a survey instrument during regular class hours. The data collection took approximately 15 min. Informed consent was obtained prior to data collection. The subjects completed the following instruments: general self-efficacy, academic motivation, student's engagement, cognitive control, student's characteristics, perceived usefulness, perceived ease of use, effectiveness of online learning, classroom interaction, course flexibility and a background information form. The authors distributed and received 203 surveys for an overall response rate of 100%. Males represented 57.6% of the sample. Also, the sample included 173 African Americans (85.2%), 18 Caucasians (7.9%), 1 Hispanic-Blacks (1%), 4 Hispanic-White (2.5%), and 7 participants who reported their racial identity as other (3.4%). Most of the participants (94.5%) were between 18 to 29 years of age. The majority of the participants were full-time students (97.5%). The participants who were included in this study are graduate and undergraduate students; seniors (47.3%); juniors (24.6%); sophomores (19.7%); freshmen (7.9%) and graduates (0.5%). The College of Business represented 36.9% of the sample; the remaining 63.1% were student in the College of Liberal Arts and Social Sciences and the College of Science and Technology.

Measures

General self-efficacy

Chen et al. (2001) developed an instrument that assessed general self-efficacy with eight items. An example of the item is "I will be able to achieve most of the goals I set for myself." A five-point Likert scale was used to measure this construct with responses ranging from strongly disagree to strongly agree. The internal reliability (alpha) for the instrument was above the minimum threshold level of greater than or equal to 0.70, as the alpha was 0.96 (Hair et al., 1998; Nunnaly, 1978).

Academic motivation

We measured student's motivation using the academic motivation scale. It is a 28-item measure with a 7-point Likert response scale (Vallerand et al., 1992). The response scales ranged from strongly disagree to strongly agree. An example of the item is "Because with only a high school degree I would not find a high paying job later on." The alpha t was 0.90.

Student's engagement

To assess student's engagement, we used the 14-item instrument developed by the National Survey of Student Engagement (2000). An example of the item is "Ask questions during class or contribute to class discussions"). A four-point Likert scale was used to measure this construct with responses ranging from never to very often. The alpha for student engagement was 0.87.

Cognitive control

To measure cognitive control, we used the 20-item instrument developed by Kolb (1984). An example of the item is "When I learn I like to deal with my feelings." A four-point Likert scale was used to measure this construct with responses ranging from least like you to most like you. The reliability estimate was 0.88.

Student's characteristics

Twenty-two items were developed by Soong et al. (2001) to measure this construct. An example of the item is, "E-learning encourages me to search for more facts than the traditional methods." The anchors ranged from strongly disagree (1) to strongly agree (5). The Cronbach alpha was 0.92.

Perceived usefulness and ease of use

To measure perceived usefulness and ease of use, we used the 8-item instrument developed by Davis (1989). The first four items measured perceived usefulness, and the remaining four assessed perceived ease of use. An example item of perceived usefulness is "Using the technology (that is, Blackboard) would enhance my effectiveness in the program." An example item of perceived ease of use is "It was easy for me to become skillful at using the technology." A seven-point Likert scale was used for these constructs with the response anchors ranging from strongly disagree to strongly agree. The alphas were 0.94 for perceived usefulness and 0.94 for perceived ease of use.

Effectiveness of online learning

Mungania (2003) developed a six-item scale with anchors ranging from no barrier (1) to very strong barrier (5) to assess this construct. An example of the item is "I cannot learn well online as I can in the classroom with other learners and the instructor." The reliability estimate was 0.76.

Course flexibility

To measure course flexibility, we used the eight-item scale developed by Arbaugh (2000a). An example of the item is, "Taking this class via the Internet allowed me to arrange my work for the class more effectively." The anchors ranged from strongly disagree (1) to strongly agree (7). The alpha was 0.92.

Classroom interaction

To measure classroom interaction, we used the 14-item scale developed by Thach and Murphy (1995). An example item of classroom interaction is "Student's interaction with faculty and other students is frequent." The anchors ranged from strongly disagree (1) to strongly agree (7), and the alpha was 0.88.

Student's satisfaction (Appendix 1)

To assess student's satisfaction, we employed the 12-item scale of Alavi et al. (1997). An example of the item is "I am satisfied with my decision to take this course via the Internet." The instrument was anchored from strongly disagree (1) to strongly agree (7). The alpha was 0.85.

Overall grade point average

On the background information form, students were asked to write their cumulative grade point average. The overall grade point average is categorized as follows: A = 4; B = 3; C = 2; D = 1; and F = 0.

Analysis

To test the hypotheses, structural equation modeling (SEM) was employed. LISREL (8.80) was used to develop and test all structural models. SEM is a sophisticated technique that establishes relationships between independent and dependent variables simultaneously (Bollen, 1989; Hair et al., 1998; Rakov and Marcoulides, 2000). It also accounts for measurement error by providing various indices on the fitness of the proposed covariance structural model and the data (Rakov and Marcoulides, 2000). SEM has been used in several fields such as psychology, econometrics, biology, sociology, education, marketing, organizational behavior and genetics (Hair et al., 1998).

Figure 1 displays the model that was evaluated in this research. In the model, general self-efficacy, academic motivation, student's engagement, cognitive control, student's characteristic, perceived usefulness, perceived ease of use, effectiveness of online learning, course flexibility, and classroom interaction were expected to predict academic performance and student's satisfaction.

Assessment of model fit

The authors used several indices to assess the goodness of fit of the model: (1) chi-square, (2) root mean square error of approximation (RMSEA), (3) incremental fit index (IFI), (4) goodness of fit index (GFI) and (5) comparative fit index (CFI). The most common goodness-of-fit index is the chi-square value. The rule of thumb is that if the p-value of the chi-square statistic is greater than 0.05 (that is, the chi-square value is non-significant), then the proposed model is acceptable (Gerbing and Anderson, 1993; Hayduk, 1987). However, because the chi-square test is very sensitive to sample size, the RMSEA is often used as the principal goodness-of-fit index (Browne and Cudeck, 1993; Steiger and Lind, 1980; Steiger, 1989). When the value of RMSEA is less than 0.05, it indicates a well fitting model. RMSEA values up to 0.08 represent reasonable errors of approximation. Bollen (1989) and Bentler (1990) have demonstrated that IFI and CFI are much less dependent on sample size. The values of GFI, IFI, and CFI can

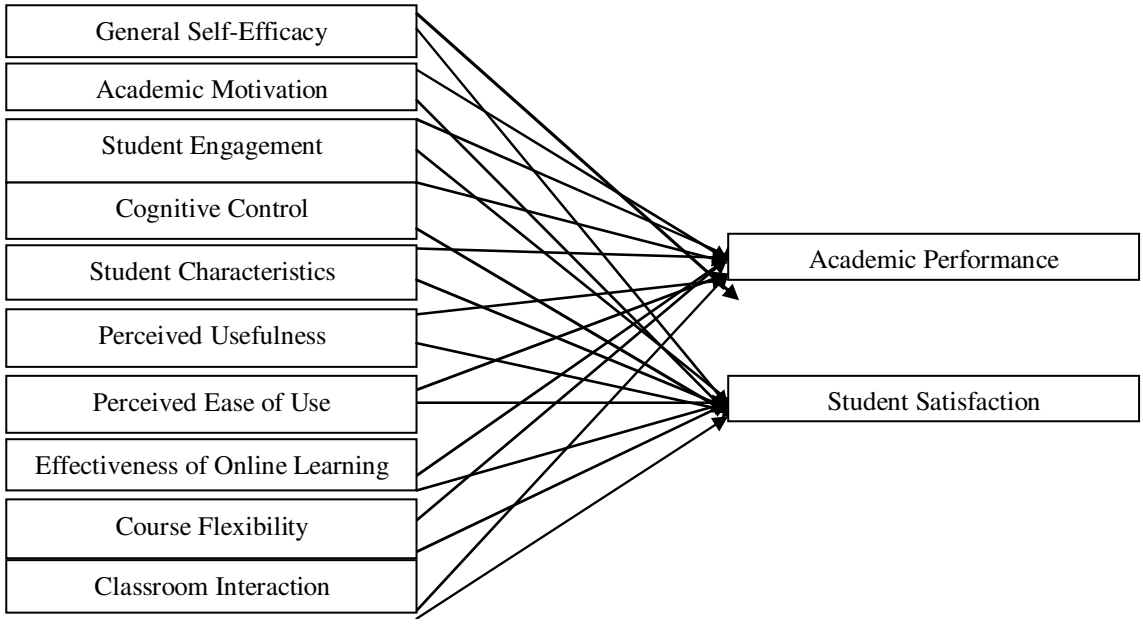

Figure 1. Hypothesized model.

vary between 0 and 1, while values closer to 1 indicate a well fitting model (Hair et al., 1998; Joreskog and Sorbom, 1993).

The authors of this study used SEM to evaluate the significance and direction of the relationships between the independent and dependent variables (Bollen, 1989). We used the recommended two-step procedure suggested by Anderson and Gerbing (1988). First, we tested the measurement model and evaluated the overall fit. The second step consisted of examining the significance of the relationships among the independent and dependent variables. The covariance matrix for the observed variables was used as input for all models (Bollen, 1989).

RESULTS

The means, standard deviations, and zero-order correlations, and reliability estimates are provided in Table 1.

Interpretation of structural equation model

The proposed model indicated an acceptable fit to the data [x^2= 1.77 (5), p = 0.88, GFI = 0.999, NFI = 0.997, CFI = 1.000, IFI = 1.005, RMSEA = 0.000]. That is, the chi-square was at its minimum value, the p-value was non-significant, and the GFI, IFI, CFI, IFI and RMSEA were within acceptable limits for good fitting models (Bollen, 1989; Steiger and Lind, 1980).

Table 2 presents the structural coefficients for the model. Partial support was established for 'research question number one', which posited that the exogenous constructs would influence academic performance. General self-efficacy and student's engagement were predictors of academic performance. Academic motivation, cognitive control, student's characteristics, perceived usefulness, perceived ease of use, course flexibility, and classroom interaction were not significant predictors of academic performance. The r-square for academic performance was 5.4% which indicates that more robust predictors may explain the variances in academic performance.

Research question number two that posited that the exogenous constructs would predict student's satisfaction was supported. Cognitive control, perceived usefulness, course flexibility, student's characteristics, effectiveness of online learning and classroom interaction influenced student's satisfaction. General self-efficacy, academic motivation, student's engagement, and perceived ease of use were not predictors of student's satisfaction. The r-square for student's satisfaction was 34%.

DISCUSSION

The present study examined the antecedents of student's satisfaction and academic performance. Using a structural equation modeling to evaluate the research questions, we found that cognitive control, student's characteristics, perceived usefulness, effectiveness of online learning, course flexibility, and classroom interaction predicted student's satisfaction. In addition, general self-efficacy and student's engagement predicted academic performance in our model. Consistent with our findings, Picciano (2002) found that student's interaction in an online course influenced perceived performance. Arbaugh (2000b) also found that perceived usefulness

Table 1. Descriptive statistics, zero-order pearson correlations, and reliability estimates.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
OGPA	2.87	0.49												
SS	52.87	14.08	-0.102	(0.86)										
GSE	34.46	6.75	0.005	0.172*	(0.96)									
AM	144.87	23.33	0.093	0.265**	0.233**	(0.91)								
SE	43.69	7.08	0.240**	0.136	0.350**	0.511**	(0.87)							
CC	64.23	8.91	0.188*	0.224**	0.280**	0.501**	0.519**	(0.88)						
SC	79.37	15.95	0.119	0.468**	0.252**	0.494**	0.314**	0.518**	(0.92)					
PU	20.33	6.19	0.019	0.518**	0.124	0.353**	0.216**	0.324**	0.628**	(0.94)				
PEU	21.98	5.63	0.062	0.460**	0.106	0.347**	0.233**	0.269**	0.641**	0.694**	(0.94)			
EOL	17.31	5.54	0.097	-0.078	0.081	0.066	0.082	0.087	0.111	0.003	-0.080	(0.77)		
CF	33.08	12.47	0.103	0.545**	0.069	0.201**	0.078	0.165*	0.340**	0.400**	0.375**	0.084	(0.92)	
CI	67.09	14.00	0.075	0.403**	0.108	0.393**	0.272**	0.321**	0.501**	0.348**	0.436**	0.077	0.199**	(0.88)

n = 203; Reliability estimates are on the diagonals in parentheses. *p< 0.05; **p< 0.01. OGPA = Grade Point Average; SS = Student Satisfaction; GSE = General Self-Efficacy; AM = Academic Motivation; SE = Student Engagement; CC = Cognitive Control; SC = Student Characteristics; PU = Perceived Usefulness; PEU = Perceived Ease of Use; EOL = Effectiveness of Online Learning; CF = Course Flexibility; CI = Course Interaction.

was a significant predictor of student's satisfaction. However, other scholars such as Thurdmond et al. (2002) did not find student's characteristics to be a significant predictor of student's satisfaction. Thus the findings appear to be mixed in this area.

CONCLUSION

The ultimate question for educational researchers is how to optimize instructional designs and technology to maximize learning opportunities and achievements in both online and face-to-face environments (Johnson et al., 2000). The rapid growth of e-learning demands that educators design a user-friendly environment that will facilitates student's learning. As more students continue to utilize e-learning, technical support provided by instructors becomes paramount.

CONTRIBUTIONS

Our findings contribute to the existing body of knowledge because our study examines factors that may influence student's satisfaction and academic performance. Another contribution of the present research is that we used a large sample African-Americans, which adds to the richness of the extant literature. Identifying the perceptions that students have regarding the factors that influence student's satisfaction and academic performance may be useful to faculty and administrators of higher learning organizations.

IMPLICATIONS AND LIMITATIONS

The findings of this study have important and practical implications. Educators should consider the importance of classroom interaction when designing e-learning courses. To be satisfied students may be more concerned with course flexibility and perceived usefulness. Furthermore, factors such as computer skills, past experience, and timely feedback received in e-learning may influence student's satisfaction. As is true for most empirical studies, the current research has some limitations. This study did have some limitations. The use of self-report measures to collect our data may have led to the problem of method bias and inflated the predicted relationships. Another limitation was our modest sample (n = 203), which may have inadvertently influenced our findings. Therefore, replication is warranted to substantiate the results of this study.

One prospect for future research would be to compare e-learning classes with traditional classes. Also, it may be prudent to conduct a subscale analysis of the factors that influence

Table 2. Unstandardized path coefficients for the baseline model.

Parameter	Path coefficient	T-value	R^2
Academic performance			5.4%
General self-efficacy	-0.081	-1.772**	
Academic motivation	0.002	0.294	
Student engagement	0.066	1.771**	
Cognitive control	- 0.026	-1.290	
Student characteristics	0.012	0.678	
Perceived usefulness	-0.107	-1.512	
Perceived ease of use	0.066	0.896	
Effectiveness of online learning	-0.005	-0.105	
Course flexibility	0.020	0.742	
Classroom interaction	0.009	0.497	
Student's satisfaction			34%
General self-efficacy	0.152	0.936	
Academic motivation	-0.025	-0.915	
Student engagement	-0.030	-0.223	
Cognitive control	0.213	2.928*	
Student characteristics	- 0.142	-2.321*	
Perceived usefulness	0.548	2.180*	
Perceived ease of use	0.115	0.436	
Effectiveness of online learning	-0.376	-2.011*	
Course flexibility	0.448	4.785*	
Classroom interaction	0.312	4.601*	

SE = standard error; T = t-value; *Significant at the 0.05 level; **Significant at the 0.10 level.

the endogenous variables in our model to include student's characteristics, academic motivation, and cognitive control, which may provide a fine-grained analysis of these predictors. Future study focusing only on freshmen should be conducted to examine how e-learning affects their performance in college. Should freshmen be encouraged or discouraged from taking e-learning courses? Do freshmen's e-learning performance different from upper classes? These questions are of importance to the academy. In addition, because the r-square value of academic performance was relatively small (5.4%), future researches need to examine more robust antecedents of this construct.

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