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Ismail Sahin
Selcuk University

Mack C. Shelley
Iowa State University, mshelley@iastate.edu

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In the current study, the Distance Education Student Satisfaction Model, estimated as a structural equation model, is proposed to understand better what predicts student satisfaction from online learning environments. In the present study, the following variables are employed based on the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) and literature: computer knowledge, flexibility of distance education, usefulness of distance education, and distance education satisfaction. Results suggest that as long as students have the skills to use online tools and perceive that distance education is a useful and flexible way of learning, communicating, and sharing, their enjoyment from online instruction will be promoted. Ultimately, this satisfaction may lead to higher levels of engagement, learning, and success in the distance education setting. Data collected from 195 undergraduate students are analyzed using Statistical Package for the Social Sciences and Analysis of Moment Structures statistical software. Implications of the findings of the present study are crucial for instructors, practitioners, and institutions planning to offer or currently engaged in offering distance education courses.

Keywords

Distance education, student satisfaction, college of education

Disciplines

Curriculum and Instruction | Educational Methods | Higher Education | Instructional Media Design | Political Science

Considering Students' Perceptions: The Distance Education Student Satisfaction Model

Ismail Sahin

Department of Computer and Instructional Technologies, College of Education, Selcuk University, Turkey // isahin@selcuk.edu.tr

Mack Shelley

Iowa State University, USA // mshelley@iastate.edu

ABSTRACT

In the current study, the Distance Education Student Satisfaction Model, estimated as a structural equation model, is proposed to understand better what predicts student satisfaction from online learning environments. In the present study, the following variables are employed based on the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) and literature: computer knowledge, flexibility of distance education, usefulness of distance education, and distance education satisfaction. Results suggest that as long as students have the skills to use online tools and perceive that distance education is a useful and flexible way of learning, communicating, and sharing, their enjoyment from online instruction will be promoted. Ultimately, this satisfaction may lead to higher levels of engagement, learning, and success in the distance education setting. Data collected from 195 undergraduate students are analyzed using Statistical Package for the Social Sciences and Analysis of Moment Structures statistical software. Implications of the findings of the present study are crucial for instructors, practitioners, and institutions planning to offer or currently engaged in offering distance education courses.

Keywords

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Schools at all levels, and institutions of higher education, have invested large budgetary and other resources in online learning tools, especially the Internet (Cheung & Huang, 2005; Rafaeli et al., 2004) since it has become a valuable tool for teaching and learning worldwide and "has brought dramatic changes to education in general and distance learning in particular" (Holsapple & Lee-post, 2006, p. 68). Now, the Internet is incorporated into educational settings to extend learning activities without depending on traditional classroom space and time (Hagel & Shaw, 2006; Jones et al., 2004; Xie, Debacker, & Ferguson, 2006). In fact, flexibility of time and place for learning is the most important feature of online instruction. While distance education provides an interactive, reflective, and collaborative learning setting (Maor, 2003), it also challenges researchers and designers of online instruction to develop educational software and find ways to support online learning environments (Ardito et al., 2006; Green, 2006; Yang & Cornelious, 2005) in which students' needs are fulfilled.

There are many ways in which Web tools can be used to support teaching and learning (Zhang, Perris, & Yeung, 2005; Frederickson, Reed, & Clifford, 2005). The contributions of distance education to individual learners may include (White, 2005):
- broadening access to education
- providing new learning environments
- individual development
- knowledge and awareness of learners in context
- the importance of understanding the learner's perspective on distance education

It is clear that online education has the potential to provide students with high-quality learning experiences. If the course content is prepared by considering students' value system, along with their social and cultural context, learning is more likely to occur (Bradshaw & Hinton, 2004; Levin & Wadmany, 2006; Muilenburg & Berge, 2005).

The literature criticizes the assumption that most students have the ability to use the information and communication technologies within an educational setting (Jones et al., 2004) and suggests that many undergraduate students entering the university have no experience with the Internet and very little with information technology generally (Arif, 2001). In fact, distance education tools might seem to be unfamiliar or difficult to learn for many students, so they might not be enthusiastic about participating in online activities (Hong, Ridzuan, & Kuek, 2003; Xie et al.,

2006). Hence, it is essential that students should have basic computer skills to maintain control of their own learning in distance education.

Much research has been conducted on distance education (Chambers, 2006; Hagel & Shaw, 2006; Hong et al., 2003; Lee et al., 2003; Liao, 2006; Muilenburg & Berge, 2005). The literature emphasizes the importance of research into student learning for professional practices of course designers and tutors, and for improving students' distance learning experiences (Levin & Wadmany, 2006; White, 2005). In designing, developing, and delivering distance education courses, students' needs and perceptions should be central. A course failing to meet student expectations and needs may lead to low levels of student involvement (Hall, 2001). Indeed, without investigating what satisfies undergraduate students in distance education courses, it is difficult to meet their needs and improve their learning. We conceptualize satisfaction from technology as an essential link in student outcomes, with greater enjoyment associated with higher levels of student engagement, which in turn is associated with increased student learning.

Moreover, distance education involves a student-centered approach in which the instructor takes the role of the facilitator and students engage in peer learning (Maor, 2003; Mitchell, Chen, & Macredie, 2005). It is clear that Web-based learning environments having a student-centered approach should consider student satisfaction. Overall, the literature suggests that there is a need to understand better the variables that affect student enjoyment of distance education courses. This article reports the results of a research study investigating predictors of student satisfaction in online learning environments. In this research, the Technology Acceptance Model (TAM) informed the selection and measurement of variables. As shown below, students' satisfaction is operationalized here in terms of their assessment of student-centered instruction, class content, real-life relevance, advising others to take the class, and timeliness of responses to questions about class content (Cronbach's standardized item alpha = .78). Relationships between satisfaction and other derived factors are examined in our statistical analysis.

One of the most-cited models (Lee et al., 2003), the TAM is proposed to understand the user acceptance of information systems (Davis, Bagozzi, & Warshaw, 1989). It provides a basis to explain the impact of variables such as beliefs, attitudes, and intentions on using a technological application. In the TAM, computer use is determined by behavioral intention that is formed by perceived usefulness and attitude. Perceived usefulness is described as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational content" (Davis et al., 1989, p. 985). The traditional TAM framework measures perceived usefulness and perceived ease of use. Here, we adopt and apply Davis et al.'s definition of perceived usefulness, and investigate the role of satisfaction with information technology, as suggested in previous research.

Internet use might be stimulated by two dimensions of motivators: extrinsic (perceived usefulness) and intrinsic (satisfaction) (Cheung & Huang, 2005). In fact, the literature shows that both perceived usefulness and perceived satisfaction directly affect undergraduate students' intention to use Internet-based learning resources (Lee, Cheung, & Chen, 2005). Two additional motivators are proposed by Straub (1994): social presence and information richness. In the present study, which evaluates student perceptions of distance education, social presence is represented by the flexibility of distance education and information richness is represented by computer knowledge. In the current study, the TAM and related literature are used to construct the following variables: computer knowledge, flexibility of distance education, usefulness of distance education, and distance education satisfaction. The relationships among these variables were examined in a structural equation model.

Methodology

The data were collected from undergraduate students of the College of Education at an Anatolian university in Turkey. Distance education tools, such as e-mail messages, discussion boards, online assignment submissions, and online exams, were used to support their learning in the class. The course, Introduction to Educational Technology, was offered during the 2005-2006 academic year.

Participants

The participants of this study consisted of 195 undergraduates. Of the participants, 60% were male ($n = 118$) and 40% female ($n = 77$). The average age for the participants was 21 years. Almost half of the students (46%) reported that they own a computer.

Research Instrument

This study analyzed self-reported opinions and perceptions of Turkish undergraduate students regarding distance education measured by responses to an online survey. The survey contained three selected participant demographics: gender, age, and computer ownership. In addition to participant demographics, the survey included Likert-type items with response choices ranging from "*strongly disagree*" to "*strongly agree.*"

Computer expertise

The first section consisted of items about the role of the online course in increasing the students' computer skills and use of the Internet. Higher scores in this part indicated higher perceived computer knowledge and use.

Flexibility of distance education

This subscale assessed students' perceptions of the flexibility characteristic of distance education. Higher scores reflected more positive beliefs about the adaptability of distance education.

Usefulness of distance education

This section included items regarding the participants' attitudes toward the usefulness of distance education. Higher scores indicated more strongly positive beliefs about the value of distance education.

Distance education satisfaction

This subscale measured how much the students were satisfied with distance education. Higher scores showed higher levels of satisfaction from distance education.

Data Analysis

Exploratory factor analysis was used to verify whether the survey items for each subscale successfully measured each variable. In addition, reliability analysis, which assesses the internal consistency among sets of survey items (Mertler & Vannatta, 2002), was employed to measure the reliability of each section of the survey. Reliability was measured using standardized Cronbach's alpha values, for which a level of .8 or above often is taken to denote strong split-half consistency. Next, structural equation modeling (SEM) procedures were used to explore relationships among the variables. For each endogenous (dependent) variable, an equation was estimated by exogenous (independent) or other endogenous variables from another equation. Both the direct and indirect effects of independent variables on the dependent variables were estimated. The structural model was tested by examining the path coefficients, which are standardized regression coefficients (betas). Statistical analyses were conducted using Statistical Package for Social Sciences and Analysis of Moment Structures (AMOS) software.

Findings

Exploratory Factor Analysis (EFA)

In the EFA, the component matrix showed positive, high correlations among the separate items included within each of these four factors (see Appendix A for the results of factor loadings and reliability tests). The KMO statistic and Bartlett's test results ($p < .001$) showed that the items constituting each of the four factors fit together appropriately for the results of EFA to be meaningful. Also, the value of the Cronbach standardized item alpha for each factor was high. These results verified that a summated rating scale for each factor can be formed meaningfully from each of these sets of variables.

Items with loadings equal to or greater than 0.50 were retained on each factor. The first factor, which included four items with reliability of 0.86, was named "computer knowledge." The second factor ("flexibility") consisted of four items with reliability of 0.66. The third factor, named "usefulness," was composed of five variables with reliability 0.83. The last section of the survey, dealing with student pleasure with distance education, included five items and its Cronbach standardized item alpha value was 0.78. This variable was labeled "satisfaction."

Structural Equation Analysis: The Distance Education Student Satisfaction Model

The structural equation analysis was conducted to test the relationships among computer knowledge, flexibility of distance education, usefulness of distance education, and distance education satisfaction. As depicted in Figure 1, the full AMOS model, which fits the data perfectly, included one exogenous variable (computer knowledge) and three endogenous variables (flexibility, usefulness, and satisfaction). Although these variables were generated through EFA, and hence represent latent traits, they are denoted in Figure 1 as rectangles because their values were calculated as the means of the survey items that loaded most strongly on each factor and each is summarized by a single composite mean score.
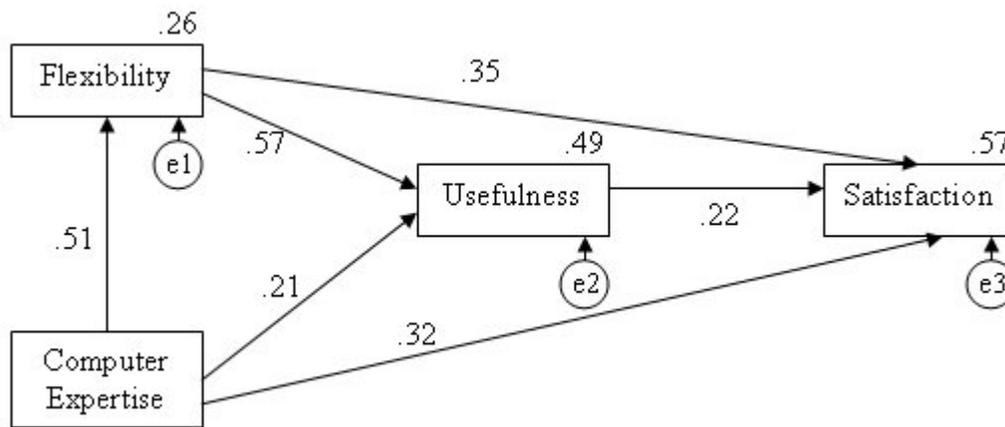

Figure 1. Distance Education Student Satisfaction Model

As seen in Table 1, total effects were decomposed into direct and indirect effects. In the model, all path coefficients were statistically significant.

Table 1. Decomposition of Total Effects for Model

Predictor variable	Dependent Variable	Total Effect [a]	Direct Effect	Indirect Effect	Standard Error	Critical Ratio
Computer Expertise	Flexibility of Distance Education	0.51	0.51	0.00	0.06	8.18**
Computer Expertise	Usefulness of Distance Education	0.50	0.21	0.29	0.06	3.54**
Flexibility of Distance Education	Usefulness of Distance Education	0.57	0.57	0.00	0.06	9.64**
Computer Expertise	Distance Education Satisfaction	0.61	0.32	0.29	0.06	5.65**
Flexibility of Distance Education	Distance Education Satisfaction	0.48	0.35	0.13	0.07	5.28**
Usefulness of Distance Education	Distance Education Satisfaction	0.22	0.22	0.00	0.07	3.36**

[a]: Total effect= Direct effect + Indirect effect; **: $p < 0.01$

The positive direct effect between computer expertise and flexibility was statistically significant ($r = .51$, $p < 0.01$). Students who perceive that they possess a higher level of computer knowledge ($t = 8.18$, $p < 0.01$) stated that they have more positive beliefs about the flexibility of distance education; 26% of the variation in flexibility was explained by computer expertise ($p < 0.01$). Thus, knowledge of students' computer skills and use significantly increases the ability to predict students' attitudes toward the adaptability of distance education. Of course, there may be a difference between students' perceptions and reality; perception, by definition, is based on one's own criteria and perspective. Some students who perceived that they had a higher level of computer expertise actually may have less computer knowledge than at least some of the students who perceived themselves as having a lower level of computer knowledge.

In the model, computer expertise affects the usefulness of distance education both directly and indirectly. Students who had more computer knowledge ($t = 3.54$, $p < 0.01$) and realized the flexibility of distance education ($t = 9.64$, $p < 0.01$) were more likely to find distance education useful. Computer expertise and flexibility explained 49% of the variation in usefulness ($p < 0.01$).

Computer expertise and flexibility influence distance education satisfaction both directly and indirectly. Students who had more computer knowledge ($t = 5.65$, $p < 0.01$), recognized the flexibility of distance education ($t = 5.28$, $p < 0.01$), and described distance education as useful ($t = 3.36$, $p < 0.01$) were more likely to satisfy from distance education. The combination of computer knowledge, flexibility, and usefulness accounted for 57% of the variation in distance education satisfaction ($p < 0.01$).

Discussion

The findings from the current study show the importance of computer knowledge and attitudinal factors in predicting student satisfaction from their distance education experience. The literature supports our finding that a higher level of computer experience is linked to greater enjoyment of users with Web-based learning (Mitchell et al., 2005). In fact, "inadequate or incomplete knowledge and awareness inevitably compromises the quality and appropriateness of learning experiences which can be provided and developed" (White, 2005, p. 170). Students' online readiness, motivation, and attitude are keys for the success of any training program (Ardito et al., 2006; Holsapple & Lee-post, 2006; Xie et al., 2006; Zhang et al., 2005). Hence, technical issues should not become a barrier to students' learning. It is crucial to note that a high level of computing experience—and not technical issues—helps students focus on learning. Students who use IT in their personal and professional lives are more comfortable and familiar with the online learning environment (Jones et al., 2004; Maor, 2003).

To fulfill students' expectations from online learning environments, they need to be supported both technically and technologically. Institutions and educators should create opportunities and devote resources to assist students in developing their computer skills and expertise needed for online learning. Before offering a distance education course, the instructor should make sure that the students have basic computer skills so they will not be frustrated and discouraged with using the tools and environments of the online class. If necessary, at the beginning of the semester, the students who have a low level of computer proficiency should be provided with a training program to assure that they gain the computer skills required for the distance education course.

The results of this study highlight the critical role of perceived usefulness in student satisfaction from Web-based learning environments. It is essential that students should value computers and distance education. If students believe that the distance education course is useful, they will be more likely to enjoy that class. It is clear that students' enjoyment of distance education is a critical factor in their acceptance and use of the online learning environment (Lee et al., 2005; Mitchell et al., 2005). The literature suggests that perceived usefulness and perceived satisfaction may increase students' use of Internet resources (Lee et al., 2005; Mitchell et al., 2005). Thus, heightened student satisfaction from their distance education experience may lead to further engagement in class activities, and eventually in higher levels of use of distance learning environments.

The findings from this study clearly show that a distance education course should provide students with great flexibility in interacting with their instructor, classmates, and the course content. Indeed, flexible course structure is a key strategy to overcome the intrinsic and extrinsic barriers to e-learning (Jones et al., 2004). As long as students have the skills to use online tools and perceive that distance education is a useful and flexible way of learning,

communicating, and sharing, their enjoyment from online instruction will be promoted. Ultimately, this satisfaction might lead to higher levels of engagement, learning, and success in the setting.

Conclusions

Understanding students' perceptions regarding distance education is the first step for developing and implementing a successful online learning environment. The primary contribution of this research is in furthering our understanding of the variables that affect student satisfaction with classroom technology. The model presented in this study is formulated in an attempt to explain student satisfaction by using a small number of variables suggested by the TAM (Davis et al., 1989) and literature. According to the TAM, the availability of the four motivators (computer knowledge, flexibility of distance education, usefulness of distance education, and distance education satisfaction) may lead to higher levels of use of distance education.

Findings and implications from the current study suggest that students' computer knowledge and perceptions, such as the perceived usefulness and flexibility of distance education, should be considered as predictors of their satisfaction from classroom technology, and ultimately for their success in online learning environments. Instructors of distance education need to focus upon preparing students to use a variety of computer technologies and be aware of the benefits of online learning. Thus, there is a need for well-designed and carefully implemented online learning environments that meet the needs and expectations of students. Web-based learning environments can be facilitated through activities that increase students' level of computer knowledge and emphasize the flexibility and usefulness characteristics of distance education. The results of this study suggest that these factors are necessary to promote student satisfaction with distance education. Hence, institutions and instructors should pay special attention to the variables affecting student enjoyment with distance education courses. Then, the learning environment might be more intuitive, engaging, and ultimately more didactic.

In addition, it should be noted that the model proposed in the present study may fit well and be defensible with the contextually-related studies and literature, but it does not imply causality. Further research is needed to confirm the validity of the model. Thus, future studies might focus on its applicability to other areas and settings. These efforts will be beneficial to the improvement of the model and the continued development of research and practice in distance education. There is no doubt that many factors may influence student satisfaction in online learning environments. Further refinement of the proposed model could identify more factors that educators can influence to improve the quality of their courses. Although more than half (57%) of the variance in student satisfaction is explained by the model, additional survey items or variables, such as environmental and institutional measures, might be included in the analysis to extend our understanding of student satisfaction with distance education.

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Appendix A: Results of Exploratory Factor Analysis and Reliability Analyses

Variables	Items	Factor Loadings	KMO and Bartlett	Standardized Item Alpha
Computer Expertise	This course helps me use the Internet sources more efficiently.	0.84	0.82***	0.86
	My use of computers increases after taking this class.	0.88		
	This course contributes to my knowledge of searching on the Internet.	0.86		
	My computer knowledge increases with the course assignments and projects.	0.78		
Flexibility of Distance Education	Distance education allows me to allocate my time better.	0.79	0.72***	0.66
	Distance education allows me to work at home comfortably.	0.68		
	In terms of use of time and location, distance education is flexible.	0.69		
	Distance education is appropriate to students with different learning capacities.	0.67		
Usefulness of Distance Education	I believe distance education is useful.	0.81	0.80***	0.83
	A degree in distance education is valuable like a degree in traditional education.	0.77		
	Distance education provides me with a valuable learning experience.	0.76		
	Distance education minimizes the inequalities in education.	0.78		
	Evaluation of the success in distance education is quite objective.	0.77		
Distance Education Satisfaction	The student-centered instruction offered in this class is enjoyable.	0.76	0.80***	0.78
	The content of this class meets my expectations.	0.80		
	I like its content from real life.	0.67		
	I advise other students to take this class.	0.68		
	I am pleased with the timely responses to my questions regarding the class content.	0.74		

***: $p < 0.001$