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ABSTRACT

To compete in today's Internet-based society, almost every college and university offers an online-based option of study whether it is a complete university experience, an entire degree program, specific course offerings, individual course sections, or web-based components used to enhance face-to-face learning. Many universities, and their faculty, have hastened to develop and keep updated online materials, yet have not stepped back to examine the materials from the end users' perspective. In this document, the authors build upon established research to apply the organizational e-learning success model developed by Wang, Wang, and Shea (2005) to the online learning environment at a regional Midwestern university with a population of approximately 10,500 students.

Keywords

E-learning systems; information system success, online learning systems, end user perceptions

INTRODUCTION

Information system success, derived in part from end-user acceptance, is a significant concern for organizations in both the for-profit and non-profit realms. Systems lacking end user acceptance face a reduced application to the business process function and, potentially, a greater likelihood of overall failure. Likewise, end users who are not satisfied with the system that they are expected to apply, are more likely to be less satisfied with work, perceive their jobs less favorably, and perform their role in the organization in a less effective manner.

Numerous articles have been written examining information systems success. In 1992, DeLone and McLean developed a frequently referenced Information Systems success model for examining IS research which they later revised in 2003. With little prior research on e-learning success models, Wang, Wang, and Shee (2005) built upon the research of DeLone and McLean (1992, 2003) and others to create a model for examining e-learning success in the business environment. In this study, the authors' build upon the research conducted by Wang et al (2005) by adapting their study and model to the university environment. The authors address the question, "Can the e-learning research model, developed by Wang et al. (2005), be applied to a university environment, and if so, what modifications to the model should be considered to examine success from the students' perspective?"

THEORETICAL BACKGROUND

Numerous research studies have extended the original work of DeLone and McLean (1992) in examining the success of various information systems. In 2003, the authors' revised their model after some 285 refereed journals had cited their original work. Developing an effective information system that users can, and want, to use is a concern across all industries and classifications of systems. Likewise, developing an effective validated instrument to determine the success of information systems is of significant interest as well.

In 1993, DeLone and McLean published a seminal article that provided a comprehensive review and integration of information system success measures. Their review and integration of success measures culminated in the development of, the often cited, DeLone and McLean (D&M) Model consisting of six factors: System Quality, Information Quality, Use, User Satisfaction, Individual Impact and Organizational Impact. Seddon (1997) later attempted to clarify and strengthen DeLone and McLean's 1993 model. Seddon refined the meaning of IS use to be that of a behavior rather than a success

measure and introduced four new variables including: Expectations, Consequences, Perceived Usefulness, and Net Benefits to Society (1997).

Ten years and numerous citations after the original publication, DeLone and McLean revisited their original framework in an effort to update the model with respect to advancements in the field and with consideration made for the body of work that it initiated including that of Seddon (2003). From their research, the authors found that their model remained foundationally strong, but could benefit from some minor adjustments. The updated model was then modified to consist of: Information Quality, System Quality, Service Quality, Intention to Use/Use, User Satisfaction and Net Benefits. In an effort to further refine and enhance research in information system success, DeLone and McLean noted that, "… an attempt should be made to reduce significantly the number of measures used to measure IS success so that research results can be compared and findings validated" (2003, p. 27)

In 2004, DeLone and McLean tested their revised model on emerging business models by examining the e-commerce systems of two online retailers, Barnes and Noble and a consumer electronics store. The authors found the model to adapt easily to the e-commerce framework and again encouraged future researchers to build upon tested measurement factors for comparison and validation rather than developing new measures.

Masrek, Shahriza, Karim, and Hussein (2007) adapted the D&M (2003) IS success model to examine intranet effectiveness according to 18 variables grouped into three antecedent factors broken into organizational, technological and individual. Using the model and the work of previous researchers, the authors proposed hypotheses for future testing that examined the relationships between the variables.

Jennex and Olfman (2005, 2006) studied the success of knowledge management systems by examining system use and determined that the "quantity of 'use'" should not be used to measure success. In further research, Jennex (2008) supported this finding and concluded that the quality of use was more important than the amount of time actually used. He also found that usage patterns changed according to user experience level.

In an effort to better explain the relationship between system usage and user satisfaction, Bokhari (2005) used meta-analysis to integrate and synthesize published research findings on information system success models. Bokhari noted that although system use and user satisfaction were often used to "measure" success, past research had produced contradictory results. Through the analysis of past research, the author found that a "medium" and significant positive relationship ($r = 0.2555$) exists between system usage and user satisfaction.

Noting an opportunity to further extend the body of knowledge in IS success research, Wang, Wang, and Shee (2005) developed a multi-dimensional model for assessing e-learning success in corporations based upon previous IS success literature and the revised D&M model. The authors developed and validated a six factor, 34 item survey instrument using data gathered from 206 respondents. The model examined e-learning success from the employee e-learner's perspective focusing upon six factors consisting of: Systems Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefit.

This article further contributes to the examination of information system success. In the remaining sections of this article, the authors build upon the developing body of research examining e-learning success models by modifying and applying the Wang et al. (2005) instrument to the online learning environment at their institution.

RESEARCH METHODOLOGY

Using the survey originally developed by Wang et al (2005) for the business e-learning environment, the authors' eliminated the questions addressing service quality, added questions associated with the online education environment, and modified the language of some of the Wang et al (2005) questions to better fit the higher education environment. The service quality questions were eliminated per the request of the online learning administrator who provided access to the university's online students and online testing resources. The survey instrument (Appendix 1) consisted of 35 questions addressed using a seven point Likert scale ranging from "strongly disagree" to "strongly agree." In addition, students were asked six demographic-type questions. The survey was administered online and 2,156 unique online students were invited to reply to the survey. Of those students invited, 809 students responded with 674 surveys being complete and usable for a response rate of 31.3%.

The survey questions were grouped according to the quality addressed and a model was developed to present the propositions addressed through the study. (Figure 1) The hypotheses that the study addresses include:

      H_1: System quality characteristics affect system use.

      H_2: System quality characteristics affect user satisfaction.

H₃: Information quality characteristics affect system use.

H₄: Information quality characteristics affect user satisfaction.

H₅: Readiness for online leaning characteristics affect system use.

H₆: Readiness for online leaning characteristics affect user satisfaction.

H₇: User satisfaction characteristics affect system use.

H₈: System use characteristics affect user satisfaction.

H₉: System use characteristics affect perceived usefulness.

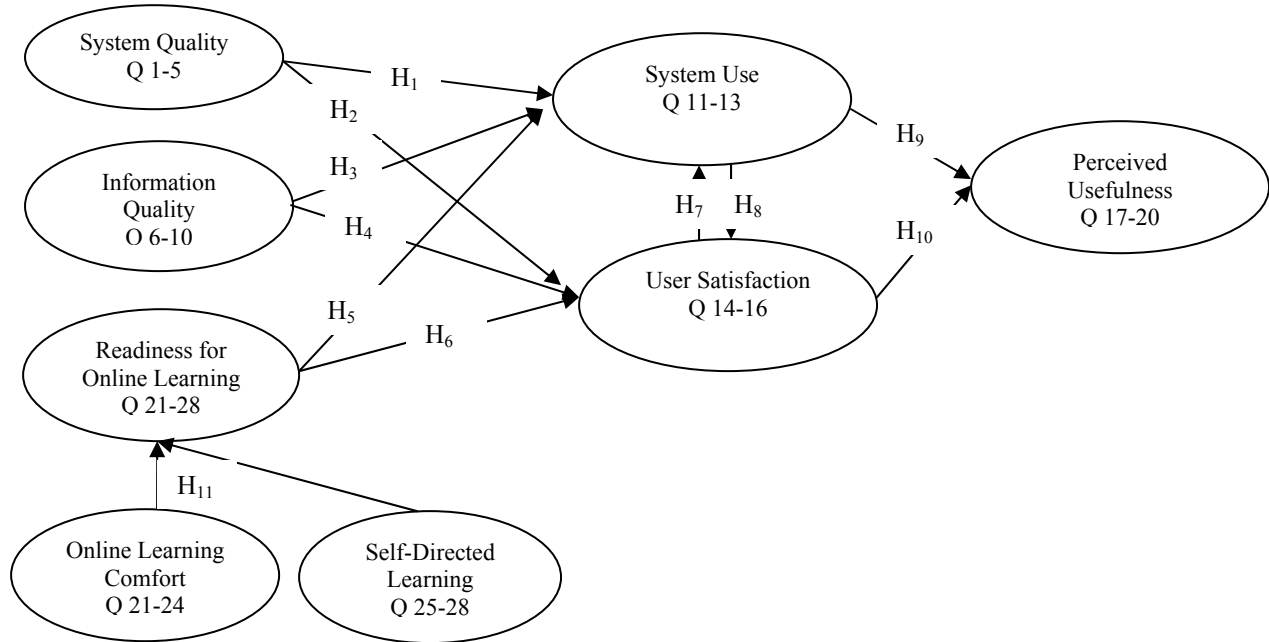H₁₀: User satisfaction characteristics affect perceived usefulness.

Figure 1. Research Model

CONCLUSION

DeLone and McLean's original and revised models (1993, 2003) have served as a framework for numerous articles examining information system success in a variety of situations and at multiple levels. This research has attempted to further their work in information system success models by modifying and applying the e-learning success instrument developed by Wang et al. (2005) to a university online learning environment.

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APPENDIX

**University Online Learning System Survey**

HERE'S YOUR CHANCE TO HELP MAKE UNIVERSITY ONLINE BETTER!

University Online needs your input. As we continue to improve the quality of the systems used to deliver University Online courses, we need feedback from students. Please complete the following short survey and help improve future online courses. Your input matters!

University Online would like to know what you think about the system used to deliver the online course(s) you are completing this semester. This system is made up of many parts including:

- course web pages
- e-mail communication with instructors and students
- information about the course, course materials, and feedback from the instructor
- online grade book, quizzes and tests, discussion forums, and electronic drop box

Please answer the following questions based on your level of agreement for each statement ranging from 1 if you strongly disagree to 7 if you strongly agree.

1	2	3	4	5	6	7
Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
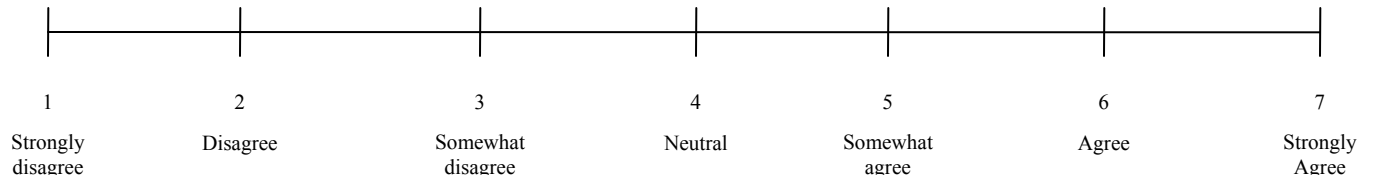
System Quality: Items 1-5
1. The system is always available.
2. The system is user-friendly.
3. The system provides interaction between users and the system.
4. The system has attractive features that appeal to users.
5. The system provides high-speed information access.

Information Quality: Items 6-10
6. The system provides information that is exactly what you need.
7. The system provides information that is relevant to learning.
8. The system provides sufficient information.
9. The system provides information that is easy to understand.
10. The system provides up-to-date information.

System Use: Items 11-13
11. I frequently use the system.
12. I depend upon the system.
13. I only use the system when it is absolutely necessary for learning.

User Satisfaction: Items 14-16
14. I do not have a positive attitude or evaluation about the way the system functions.
15. I think the system is very helpful.
16. Overall, I am satisfied with the system.

Criterion: Items 17-20
17. The system has a positive impact on my learning.
18. Overall, the performance of the system is good.
19. Overall, the system is successful.
20. The system is an important and valuable aid to me in the performance of my class work.

Readiness for Online Learning: Items 21-28
(Comfort with online learning)
21. I am able to easily access the Internet as needed for my studies.
22. I am comfortable communicating electronically.
23. I am willing to actively communicate with my classmates and instructors electronically.
24. I feel that online learning is equal to the quality of traditional classroom learning.
(Self-management of learning)
25. When it comes to learning and studying, I am a self-directed person.
26. In my studies, I am self-disciplined and find it easy to set aside reading and homework time.
27. I am able to manage my study time effectively and easily complete assignments on time.
28. In my studies, I set goals and have a high degree of initiative.

E-learning System Self-efficacy: Items 29-35
(Perceived Web Self-efficacy)
29. I feel confident using a web browser.
30. I feel confident taking online tests or quizzes.
31. I feel confident uploading/downloading files.
32. I feel confident exchanging ideas with other students in online chats or discussion forums.
(Perceived Computer Self-efficacy)
33. I could use a computer to learn if there was no one around to tell me what to do.
34. I could use a computer to learn if I had only the software manuals available.
35. I could use a computer to learn if I had a lot of time to complete tasks.

Demographic: Items 36-41
36. What is your age? (open item)
37. What is your gender? (forced-choice item with 1= Male or 2= Female)
38. What is your major? (open item)
39. What is your academic standing? (forced-choice with 1=Fr, 2=So, 3=Jr, 4=Sr, 5=Graduate)
40. Are you taking only online classes this semester? (forced-choice item with 1= Yes and 2= No)
41. How many courses are you taking this semester? (forced-choice with 1, 2, 3, 4, 5 or more)