

The Effects of E-Learning System Service Quality and Users' Acceptance on Organizational Learning

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ABSTRACT

This study examines the effects of e-learning system service quality and users' acceptance on organizational learning. The sample was drawn from 15 companies certified by the E-Learning Quality Certification Center of Taiwan. The authors used UTAUT, SERVQUAL, and SLAM scales to collect data, and the structural equation model (SEM) to examine the hypothesized model. The results show that (1) e-learning system service quality has a positive effect on acceptance and use of e-learning technology, (2) the latter has a positive effect on organizational learning effectiveness, and (3) acceptance and use of e-learning technology plays a full mediating role in the relationship between e-learning system service quality and organizational learning effectiveness. Although e-learning system service quality has no direct effect on organizational learning effectiveness, the result has practical implications for institutions in that e-learning system service quality can strengthen organizational learning effectiveness via well-structured e-learning technology. When implementing e-learning, institutions should manage both e-learning technology and the quality of e-learning service. The more users are satisfied with e-learning service, the more organizational learning will be enhanced.

Keywords: E-learning, technology acceptance, service quality, organizational learning

1. INTRODUCTION

As the rapid change in economic context continues, organizations are forced to turn to learning organization or intelligent organization in order to enhance their competitiveness. Traditional training can no longer match the speed of organization development; hence, technology has appreciable implications for organizational capability and employee development to meet these challenges [Heraty, 2004].

According to the learning system perspective posed by Marquardt [1996], learning organization is composed of five systems: the organization, people, knowledge, technology, and learning. Technology used to be the groundwork for organizational learning, especially information technology, learning-based technology, and electronic performance support systems. They contribute to organizational learning as an infrastructure, and when they are used to support learning activities via the Internet, we call them e-learning technology. E-learning has become the major factor in the delivery and diffusion of workplace learning that affect the effectiveness of training [Lim, Lee, and Nam, 2007].

Empirical studies show that e-learning technology has positive effects on learning effectiveness and job performance as well [Beamish, Armistead, Watkinson, and Armfield, 2002; Egan, Hessian, Taylor, and Zenger, 2003; Green, 2004; Harris, 2003; Huang, Chu, and Guan, 2007]. Further, e-learning technology plays an important role in facilitating learning content and interacting with learners in organizational learning [Juan, Real, Leal, and Roldan, 2006; Robey, Boudreau, and Rose, 2000]. Researchers indicate that e-learning technology is an important factor in organizational learning and that the effectiveness of organizational learning can be enhanced through e-learning [Gill, 1995; Real, Leal, and Roldan, 2006]. They do not, however, verify directly that e-learning has a positive effect on organizational learning effectiveness [Chang, 2007]. In addition, e-learning system service quality might be an important factor in e-learning outcomes.

This study, therefore, uses end-users' perspectives to investigate the effects of e-learning system service quality and users' acceptance on organizational learning. We apply the most widely used technology acceptance model – Unified Theory of Acceptance and Use of Technology (UTAUT) – to investigate users' attitudes, intentions, and satisfaction. Service quality is also a determinant of user perceptions [Roca, Chiub, and Martinez, 2006]. The MIS field uses

SERVQUAL to measure information systems service quality in order to understand the difference between expected and perceived service [Jiang, Klein, and Carr, 2002]. In our study, we also use the Information System Success (ISS) Model to understand the users' perception from an organizational service unit. This will provide an opportunity for the organization service unit to view its e-learning service. We also use the Strategic Learning Assessment Map (SLAM) proposed by Bontis, Crossan, and Hulland [2002]. In brief, therefore, the current study seeks first to understand the perceptions of employees after using e-learning technology and their perceptions of organizational learning effectiveness, and second to examine the relationship between them.

2. THEORETICAL BACKGROUND

In his comprehensive e-learning solution model, Henry refers to the three parts of e-learning as *technology*, *content*, and *service* [Henry, 2001]. The current study follows Henry's view of e-learning to explore the end-users' perceptions these three parts. In our discussion, *technology* refers to e-learning technology.

2.1. E-Learning in Organizations

Information technology plays a vital role as the support, communication, and delivery media for organizational learning [Robey et al., 2000]. Internet and its associated technologies enable us to integrate many diverse learning resources and events into powerful and cohesive learning paths [Henry, 2001]. Internet technology makes e-learning possible in a business setting and allows it to take place during the course of work. Offering advanced Internet-related technologies to enhance organizational learning not only facilitates organizational memory and communication among members of the organization, but also enhances more effective learning. The speed of the Internet makes it possible to introduce new products, services, and features almost instantaneously, which means that employees have to learn and consolidate new information rapidly [Wild, Griggs, and Downing, 2002]. E-learning is the appropriate application of the Internet to support the delivery of learning content, skills, and knowledge in a holistic approach that is not limited to any specific courses, technologies, or infrastructures [Henry, 2001]. E-learning also provides a new set of tools that can add value to traditional learning modes. Many empirical studies support the idea that effective e-learning benefits organization success [Sun et al., 2006]. That is why e-learning plays such an important role in organizational training.

2.2. Technology Acceptance Theories

Technology acceptance theories are used to explain how users come to accept a specific technology. Among theory models, two of the most widely accepted are the Technology Acceptance Model (TAM) proposed by Davis et al. [Davis, Bagozzi, and Warshaw, 1989] and the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh, Morris, Davis, and Davis [2003].

TAM explains the acceptance of information technology in performing tasks and identifies perceived usefulness and perceived ease of use as two key determinants that enhance the use of technology. Although the model is supported by empirical studies [Lee and Lee, 2008; Parka, Romanb, Leec, and Chungd, 2009; Roca et al., 2006], critics doubt it could only be applied in the education context [Ma, Andersson, and Streith, 2005], and point out that it ignores the social influence on technology acceptance [Chen, Gillensonb, and Sherrell, 2002].

UTAUT uses psychology-related and behavior-related theories to address the drawbacks of TAM and thus extend TAM to fit the job environment. UTAUT proposes three direct determinants of intention to use; namely, performance expectancy, effort expectancy, and social influence. It further purposes two direct determinants of use behavior; namely, behavioral intention and facilitating conditions. In addition, it proposes four moderators of key relationships – gender, age, experience, and voluntariness of use. The UTAUT model is more suitable, therefore, for assessing the likelihood of success for new technology implementation in organizational settings and has been validated by empirical research [Lai and Chen, 2009; and Min, Ji, and Qu, 2008]. For these reasons, the UTAUT model was selected as the theory foundation for the current study. The determinants of the UTAUT model are as follows.

- Performance Expectancy (PE): The degree to which an individual believes that using the e-learning technology will help him/her to attain gains in job performance
- Effort Expectancy (EE): The degree of ease associated with the use of e-learning technology
- Social Influence (SI): The degree to which an individual perceives that important others believe that he or she should use the new e-learning technology

- Facilitating Conditions (FC): The degree to which an individual believes that an organizational and technical infrastructure exists to support use of e-learning technology
- Behavioral Intention (BI): The degree to which an individual wants to use e-learning technology again and the degree to which he/she will use what is learned in their work context

2.3. E-Learning Service Quality

The end-users' perceived service quality plays an important role in the adoption of e-learning in a company. To understand how service quality affects system success, IT professionals developed the SERVQUAL scale to assess information system service quality. SERVQUAL is based on the Information System Success (ISS) model revised by DeLone and McKean in 2003 [Landrum, Praybutok, Keppelman, and Zhang, 2008]. The ISS model and SERVQUAL are devoted to ensuring the quality of the information system, and Landrum et al. [2008] mixed both to enhance the power of measurement. The constructs can be divided into the following dimensions:

- SERVQUAL (Service Quality, SQ): The degree of information system service quality
- Information Quality (IQ): The characteristics of information system output, such as accuracy, currency, relevance, and completeness
- System Quality (SyQ): Performance characteristics such as response time and ease of use
- Perceived Useful (PU): The extent to which information system use and user satisfaction measure user's feelings regarding the information system
- Perceived Involvement (PI): The effects of the information system on the performance of users and organizations

The Perceived Involvement (PI) factor was originally designed as an open-end question; therefore, PI was not included in the questionnaire used in this study.

2.4. Organizational Learning

Organizational learning (OL) is a dynamic process of knowledge creation that occurs over time and across levels (individual, group, and organization) [Real, Leal, and Roldán, 2006; Crossan, Lane, and White, 1999]. It is a

process that also creates tension between assimilating new learning (feed-forward where new ideas and actions flow from the individual to the group and to the organization) and exploiting or using what has already been learned (feed-back, which flows from the organization to the group and to the individual) [Rhodes and Lok, 2008]. These concepts were derived from the Strategic Learning Assessment Map (SLAM) proposed by Bontis et al. [2002]. SLAM integrates the key contents of the OL. It analyzes OL into multiple levels (individual, group, and organizational) and proposes the conceptual operative framework (feed-forward and feed-back). In addition, it uses learning stocks and flow magnitudes as constructs corresponding to OL literature. Learning stocks are the units of learning outcome used to measure three levels of OL (individual, group, and organizational). Learning flows (feed-forward and feed-back) are the directions used to indicate learning interactions. This study uses SLAM as the OL measurement construct to measure the effectiveness of OL. The learning stocks and flows are as follow:

- Individual-Level Learning Stocks (II): Individual competency, capability and motivation to learn the required tasks
- Group-Level Learning Stocks (GG): Group knowledge or knowledge incorporated into social interactions, a product of shared understanding
- Organizational-Level Learning Stocks (OO): Knowledge or skills internalized in non-human aspects of the organization, including systems, structures, procedures, and strategy
- Feed-Forward Learning Flows (FF): Transfer of learning from the individual to the collective sphere
- Feed-Back Learning Flows (FB): The use made of learning that has become institutionalized (learning that is embedded in the organization, in its systems, structures, strategy, etc.)

In the current study, the researchers investigated the relationships among three learning stocks and two flows to determine whether employees really learned after using e-learning technology and receiving e-learning service.

3. RESEARCH MODEL

The conceptual framework for this study is shown in Figure 1. Following the figure is a discussion of the hypotheses explored by the researchers.

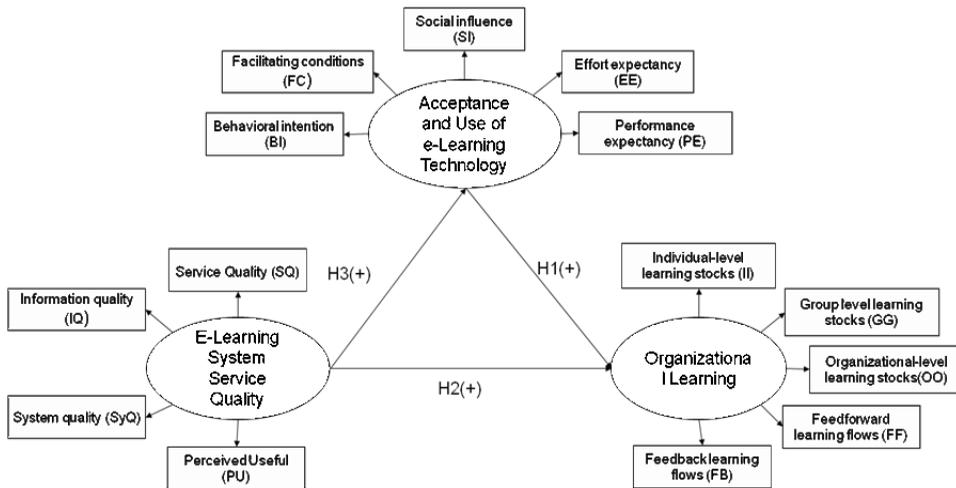


Figure 1. Conceptual Research Model

3.1. E-Learning Technology and Organizational Learning

Information technology is becoming essential infrastructure for most organizational success. Learning processes and presentation arrangements are deeply influenced by technological advancement [Masino, 1999]. Technology designed to enhance organizational learning, and successful implementation of the technologies that enable organizational learning, depend on the organization's present capacity to learn [Robey, Boudreau, and Rose, 2000]. Empirical evidence shows that information technologies transfer knowledge successfully into the work place and enhance learning processes and activities, thus promoting effective organizational learning [Daghfous, 2004]. In this study, information technology is defined as e-learning technology that is used for organizational learning through network learning technology in an organizational setting. Studies [Daghfous, 2004; Janson, Cecez-Kecmanovic, and Zupancic, 2007] show that technology can enable OL, whereas bad design or utility may disable it.

As stated earlier, UTAUT is a widely accepted tool for measuring end-users' perceptions of implementing or using technology. Wang and Yang [2005] used UTAUT to examine the stocks of on-line learning outcomes. When new technology is introduced, its value and its potential to create value are realized only when individuals are willing to accept and adopt it into their daily work. Based on the previously cited empirical studies, we hypothesized that:

H₁: Acceptance and use of e-learning technology has a positive effect on organizational learning.

3.2. E-Learning System Service Quality and Organizational Learning

Effective organizational learning (OL) is a necessary ingredient for any organization to maintain its competitive advantage in the long run. Further, creating a suitable OL environment is vital to the success or the failure of OL [Gupta and Thomas, 2001]. The OL environment includes not only hardware (i.e., learning system), but also software (i.e., leadership, administrative measures, and any kind of service provided by the organization). Hence, specifying the foundations and the building blocks of learning in the organizational context is critical [Heraty, 2004]. This study focuses on both e-learning technology hardware and software issues. Bhattacharjee [2001] indicates that e-learning service has an impact on users' intention toward OL promotion. In this study, therefore, the ISS model is used to examine the perception of e-learning service in the OL context. Based on the previously cited empirical findings, we hypothesize that:

H₂: E-learning system service quality has a positive effect on organizational learning.

3.3. E-Learning System Service Quality and Use of E-Learning Technology

From the users' perspective, they are motivated to use e-learning when they receive high-quality e-learning service to overcome problems. Similarly, end-users become more interested in learning and thus increase their satisfaction when the e-learning system provides useful information for their job functions [Roca et al., 2006]. It has been shown that e-learning system service quality has positive effects on the implementation of technology [Landrum et al., 2008; Wu and Wang, 2007]. The end-users' perception of the acceptance and use of e-learning technology will be influenced, therefore, by the service quality provided by the organization. It is rational to hypothesize that:

H₃: E-learning system service quality has a positive effect on the acceptance and use of e-learning technology.

4. RESEARCH DESIGN

Literature review was used to provide a solid foundation for this study aimed at investigating end-users' perceptions of the effect of using e-learning technology and service quality on organizational learning. The researchers reviewed relevant literature on the acceptance and use of technology, e-learning service quality, and organizational learning. After formulating three hypotheses, we used a mailed questionnaire to collect information to test the hypotheses.

4.1. Sample and Data Collection Procedures

Content validity and face validity of the survey instrument were assessed by a panel of experts. Based on their feedback, the questionnaire was modified and revised. The sample was drawn from benchmark companies in Taiwan with at least one year's experience in using e-learning technology. There were two sample selection criteria: (1) employees of the company must have received professional training through an e-learning technology system; and (2) the company must have used e-learning technology for training within the last six months. The mail sample was drawn from the data pool of the E-Learning Quality Certification Center of Taiwan for the years 2005 through 2008. A total of 55 companies were included in the data pool for those years. We contacted the human resources department of these companies via telephone and e-mail, and a total of 15 companies agreed to join the study. We mailed 20 questionnaires to each of the 15 companies and received 216 valid questionnaires from 12 of the 15 companies (75% response rate).

4.2. Measures

Based on the literature review, we used UTAUT, SERVQUAL, and OL to collect survey data. Items for "Acceptance and Use of e-Learning Technology (UTAUT)" were adapted from prior work by Venkatesh et al. [2003]. Items for "E-Learning System Service Quality (SERVQUAL)" were adopted from work by Landrum et al. [2008]. Items for measuring "Organizational Learning (OL)" were derived from Bontis, et al. [2002], and the relative re-tested reliabilities were quoted from Real et al. [2006]. A 5-point Likert-type scale – 1 for "Strongly disagree" to 5 for "Strongly agree" – was used for all the items. Table 1 shows the source and references for the survey instrument.

Table 1
Source and References for Survey Instrument

CONSTRUCTS		RELIABILITY	REFERENCE
Acceptance and Use of E-Learning Technology	PE	0.92	Venkatesh et al., 2003
	EE	0.91	
	FC	0.87	
	SI	0.88	
	BI	0.85	
E-Learning System Service Quality	SQ	0.96	Landrum et al., 2008
	IQ	0.92	
	SyQ	0.98	
	PU	0.97	
Organizational Learning	II	0.93	Bontis, et al., 2002; re-tested reliability quoted from Real et al., 2006
	GG	0.95	
	OO	0.95	
	FF	0.94	
	FB	0.92	

4.3. Data Analysis

Structural equation modeling (SEM) was used to analyze and test the relationships among “acceptance and use of e-learning technology,” “e-learning system service quality,” and “organizational learning.”

4.3.1. Reliability and Factor Loading

Reliability and factor loading criteria were used to evaluate the appropriateness of the measurement instrument. Reliability of the survey instrument was established by calculating Cronbach's alpha (α) to measure internal consistency. As shown in Table 2, all of construct Cronbach's alpha values ranged from 0.83 to 0.97 (above the recommended level of 0.7). Confirmatory Factor Analysis (CFA) was used to test the convergent validity of each construct.

4.3.2. Descriptive Statistics and Correlations

Table 3 shows the means, standard deviations, and correlations for all measures. As indicated, all of variables were significantly correlated. The mean

of variables was between 3.53 and 3.86. They were all greater than the middle value 3.5.

Table 2
Summary of Means, SD, Loading, and Cronbach' α for Measurement Items

Items	Mean	S.D.	Loading
ORGANIZATIONAL LEARNING			
Individual-level learning stocks (II)			Cronbach's $\alpha = 0.97$
II1 Individuals are current and knowledgeable about their work.	3.82	0.61	0.68
II2 Individuals are aware of the critical issues that affect their work.	3.98	0.52	0.67
II3 Individuals feel a sense of accomplishment in what they do.	4.03	0.56	0.69
II4 Individuals generate many new insights.	3.88	0.65	0.69
II5 Individuals feel confident in their work.	3.86	0.65	0.69
II6 Individuals feel a sense of pride in their work.	3.65	0.73	0.76
II7 Individuals have a high level of energy at work.	3.69	0.69	0.71
II8 Individuals are able to grow through their work.	4.00	0.66	0.74
II9 Individuals have a clear sense of direction in their work.	3.60	0.76	0.68
II10 Individuals are able to break out of traditional mind-sets to see things in new and different ways.	3.71	0.68	0.67
Group-level learning stocks (GG)			Cronbach' $\alpha = 0.87$
GG1 In meetings, we seek to understand everyone's point of view.	4.01	0.61	0.67
GG2 We share our successes within the group.	3.92	0.64	0.76
GG3 We share our failures within the group.	3.85	0.66	0.76
GG4 Ideas arise in meetings that did not occur to any one individual.	4.08	0.73	0.68
GG5 We have effective conflict resolution when working in groups.	3.55	0.76	0.75
GG6 Groups in the organization are adaptable.	3.55	0.83	0.68
GG7 Groups have a common understanding of departmental issues.	3.56	0.71	0.67
GG8 Groups have the right people involved in addressing the issues.	3.65	0.77	0.76
GG9 Different points of view are encouraged in group work.	3.78	0.75	0.82
GG10 Groups are prepared to rethink decision when presented with new information.	3.68	0.76	0.76
Organizational-level learning stocks (OO)			Cronbach' $\alpha = 0.93$
OO1 We have a strategy that positions us well for the future.	3.32	0.77	0.76
OO2 The organizational structure supports our strategic direction.	3.52	0.69	0.76
OO3 The organizational structure allows us to work effectively.	3.55	0.67	0.73
OO4 Our operational procedures allow us to work efficiently.	3.46	0.76	0.76
OO5 The organization's culture could be characterized as innovative.	3.47	0.83	0.74
OO6 We have a realistic yet challenging vision for the organization.	3.55	0.76	0.73
OO7 We have the necessary systems to implement our strategy.	3.73	0.64	0.75
OO8 Our organizational systems contain important information.	3.72	0.63	0.76
OO9 We have company files and databases that are up-to-date.	3.58	0.77	0.69
OO10 We have an organizational culture characterized by a high degree of trust.	3.48	0.80	0.69

--Cont'd

Items	Mean	S.D.	Loading
ORGANIZATIONAL LEARNING (cont'd)			
Feed-forward learning flows (FF)			Cronbach' α = 0.87
FF1 Lessons learned by one group are actively shared with others.	3.57	0.72	0.71
FF2 Individuals have input into the organization's strategy.	3.48	0.72	0.67
FF3 Groups propose innovative solutions to organization-wide issues.	3.55	0.65	0.66
FF4 Recommendations by groups are adopted by the organization.	3.44	0.65	0.70
FF5 We do not "reinvent the wheel."	3.25	0.73	0.67
FF6 Individuals compile information for everyone to use.	3.75	0.60	0.72
FF7 Individuals challenge the assumptions of the group.	3.69	0.64	0.78
FF8 The company utilizes the intelligence of its workforce.	3.65	0.67	0.68
FF9 The "left hand" of the organization knows what the "right hand" is doing.	3.46	0.82	0.69
FF10 Results of the group are used to improve products, services and processes.	3.48	0.77	0.72
Feed-back learning flows (FB)			Cronbach' α = 0.91
FB1 Policies and procedures aid individual work.	3.56	0.64	0.64
FB2 Reward systems recognize the contribution made by groups.	3.54	0.81	0.67
FB3 Group decisions are supported by individuals.	3.59	0.65	0.70
FB4 Company goals are communicated throughout the organization.	3.37	0.73	0.67
FB5 Our recruiting practices enable us to attract the best talent.	3.40	0.71	0.73
FB6 Company files and databases provide the necessary information to do our work.	3.69	0.70	0.71
FB7 Information systems make it easy for individuals to share information.	3.74	0.73	0.75
FB8 Training is readily available when it is needed to improve knowledge and skills.	3.70	0.69	0.70
FB9 Cross-training, job rotation and special assignments are used to develop a more flexible workforce.	3.47	0.85	0.74
FB10 When making decisions for the future, we do not seem to have any memory of the past.	3.24	0.78	0.71
ACCEPTANCE AND USE OF E-LEARNING TECHNOLOGY			
Performance expectancy (PE)			Cronbach' α = 0.83
PE1 I would find the system useful in my job.	3.83	0.70	0.81
PE2 Using the system increase my productivity.	3.81	0.68	0.79
PE3 Using the system enables me to accomplish tasks more quickly.	3.77	0.68	0.75
PE4 If I use the system, I will increase my chances of getting a raise.	3.09	0.95	0.73
Effort expectancy (EE)			Cronbach' α = 0.91
EE1 My interaction with the system would be clear and understandable.	3.75	0.68	0.73
EE2 It would be easy for me to become skillful at using the system.	3.79	0.65	0.74
EE3 I would find the system easy to use.	3.93	0.59	0.86
EE4 Learning to operate the system is easy for me.	3.95	0.62	0.81

Cont'd

Items	Mean	S.D.	Loading
ACCEPTANCE AND USE OF E-LEARNING TECHNOLOGY (Cont'd)			
Social influence (SI)		Cronbach's $\alpha = 0.84$	
SI1 People who are important to me think that I should use the system.	3.52	0.72	0.78
SI2 In general, the organization has supported the use of the system.	3.86	0.64	0.68
SI3 People who influence my behavior think that I should use the system.	3.66	0.70	0.68
Facilitating conditions(FC)		Cronbach's $\alpha = 0.85$	
FC1 I have the resources necessary to use the system.	3.71	0.69	0.70
FC2 I have the knowledge necessary to use the system.	3.71	0.63	0.76
FC3 A specific person (or group) is available for assistance with the system difficulties.	3.74	0.62	0.77
Behavioral intention(BI)		Cronbach's $\alpha = 0.88$	
BI1 I intend to use the system in the next N months.	3.78	0.69	0.77
BI2 I predict I would use the system in the next N months.	3.73	0.67	0.74
BI3 I plan to use the system in the next N months.	3.59	0.72	0.76
E-LEARNING SYSTEM SERVICE QUALITY			
Service Quality (SQ)		Cronbach's $\alpha = 0.96$	
SQ1 Dependability in handing users' problems	3.52	0.65	0.68
SQ2 Willingness to help users	3.69	0.66	0.77
SQ3 Readiness to respond to users' request	3.62	0.67	0.75
SQ4 Courteous staff	3.76	0.64	0.78
SQ5 Staff who instill confidence in users	3.64	0.65	0.80
SQ6 Staff who have the knowledge to answer users' questions	3.69	0.63	0.73
SQ7 Giving users individual attention	3.52	0.67	0.69
SQ8 Staff who have the users' best interests at heart	3.61	0.68	0.71
SQ9 Staff who deal with users in a caring fashion.	3.64	0.64	0.80
SQ10 Staff who understand the needs of users	3.51	0.70	0.78
SQ11 Good relations between staff and users	3.59	0.66	0.77
SQ12 Communication between staff and users	3.63	0.68	0.77
Information quality (IQ)		Cronbach's $\alpha = 0.81$	
IQ1 Accuracy of information received	3.53	0.69	0.75
IQ2 Completeness of information received	3.53	0.69	0.82
IQ3 Relevance of information received	3.64	0.69	0.65
System quality (SyQ)		Cronbach's $\alpha = 0.92$	
SyQ1 An online catalog that is easy to use	3.67	0.62	0.74
SyQ2 An online catalog that is easy to learn	3.67	0.61	0.84
SyQ3 An online catalog that you can interact with in a clear and understandable way	3.66	0.65	0.83
SyQ4 An online catalog that is easy to become skillful at using.	3.66	0.63	0.83
Perceived useful (PU)		Cronbach's $\alpha = 0.95$	
PU1 The information service center enables me to accomplish tasks faster.	3.73	0.69	0.78
PU2 The information service center improves my ability to do research.	3.64	0.70	0.82
PU3 The information service center enhances my effectiveness.	3.64	0.69	0.82
PU4 The information service center enables me to be more productive.	3.68	0.68	0.80
PU5 The information service center makes it easier to do research.	3.60	0.68	0.76
PU6 I find the information service center at this organization useful.	3.75	0.63	0.78

Table 3
Correlations of Construct Variables

	Mean	SD	II	GG	OO	FF	FB	PE	EE	SI	FC	BI	SQ	IQ	SyQ	PU
II	3.82	0.45	1													
GG	3.76	0.49	0.53*	1												
OO	3.54	0.58	0.44*	0.63*	1											
FF	3.53	0.48	0.42*	0.63*	0.77*	1										
FB	3.53	0.54	0.44*	0.56*	0.74*	0.78*	1									
PE	3.63	0.60	0.45*	0.42*	0.49*	0.52*	0.59*	1								
EE	3.86	0.56	0.38*	0.27*	0.30*	0.32	0.35*	0.56*	1							
SI	3.65	0.57	0.43*	0.34*	0.43*	0.45*	0.48*	0.69*	0.55*	1						
FC	3.72	0.57	0.34*	0.31*	0.36*	0.40*	0.40*	0.53*	0.65*	0.65*	1					
BI	3.7	0.62	0.46*	0.34*	0.40*	0.41*	0.49*	0.66*	0.54*	0.64*	0.59*	1				
SQ	3.62	0.54	0.49*	0.35*	0.47*	0.50*	0.49*	0.58*	0.55*	0.64*	0.65*	0.56*	1			
IQ	3.57	0.59	0.39*	0.32*	0.37*	0.40*	0.37*	0.52*	0.44*	0.51*	0.52*	0.50*	0.69*	1		
SyQ	3.67	0.56	0.36*	0.29*	0.39*	0.36*	0.39*	0.52*	0.54*	0.51*	0.53*	0.48*	0.58*	0.53*	1	
PU	3.67	0.60	0.45*	0.30*	0.39*	0.43*	0.48*	0.70*	0.57*	0.66*	0.62*	0.67*	0.73*	0.64*	0.62*	1

(N=216, p<.01)

II = Individual-level learning stocks

GG = Group-level learning stocks

OO = Organizational-level learning stocks

FF = Feed-forward learning flows

FB = Feed-back learning flows

PE = Performance expectancy

EE = Effort expectancy

SI = Social influence

FC = Facilitating conditions

BI = Behavioral intention

SQ = Service quality

IQ = Information quality

SyQ = System quality

PU = Perceived usefulness

4.3.3. Structural Equations Modeling and Hypothesis Testing

The test of the structural model was performed using the LISREL 8.8 vision procedure, a software package designed to perform the structural equations model approach to path analysis. To assess how well the model represents the data, the goodness of fit indices was tested. We used the chi-square test statistic, root mean square error of approximation (RMSEA), the goodness-of-fit index

(GFI), the normed fit index (NFI), the non-normed fit index (NNFI), the comparative fit index (CFI), and adjusted goodness of fit index (AGFI) to test the model fit. According to the calculated correlation coefficients and indices values shown in Table 3 and Table 4, the hypothesized research model provides a very good fit to the data. The $\chi^2 = 157.35$ ($p=0.00$) $df = 74$, χ^2 / df was 2.12, the remaining five indices: NFI = 0.97; NNFI = 0.98; GFI = 0.98; RMSEA = 0.072; CFI = 0.91; AGFI = 0.87 (Table 4).

Table 4
Overall Model t Indices for the Research Model

	Results	Recommended Value
χ^2 -statistic χ^2 / df	2.13	≤ 5
NFI	0.97	≥ 0.9
NNFI	0.98	≥ 0.9
GFI	0.91	≥ 0.9
CFI	0.98	≥ 0.9
RMSEA	0.07	≤ 0.01
AGFI	0.87	≥ 0.8

The standardized path coefficients for the research model are presented in Figure 2. Two of the paths were significant in the hypothesized direction – namely, the path connecting “acceptance and use of e-learning technology” and “organizational learning” and the path of “e-learning system service quality” and “acceptance and use of e-learning technology.” Results indicate that confirmation was associated with perceived usefulness, perceived ease of use, and cognitive absorption. Hypothesis 1 (t-value = 9.00, $p < .005$, $\lambda = 0.67$) and 3 (t-value = 10.60, $p < 0.05$, $\lambda = 0.90$) was supported.

The path from “e-learning system service quality” to “organizational learning,” however, was not supported, meaning that e-learning system service quality has no direct significant effect on organizational learning. Hypothesis 2, therefore, was not supported. The significant indirect effect indicates a significant path of “e-Learning system service quality” effect on “organizational learning” via the mediator, “acceptance and use of e-learning technology.”

The results of direct effects indicate that: (a) “acceptance and use of e-learning technology” has a positive effect on “organizational learning,” and (b) “e-learning system service quality” has a positive effect on “acceptance and use

of e-learning technology.” The result of significant indirect effect indicates that “acceptance and use of e-learning technology” plays a full mediating role in the relationship between “e-learning system service quality” and “organizational learning.” It signifies that “e-learning system service quality” may affect “organizational learning,” but a significant effect could occur only through the “acceptance and use of e-learning technology.”

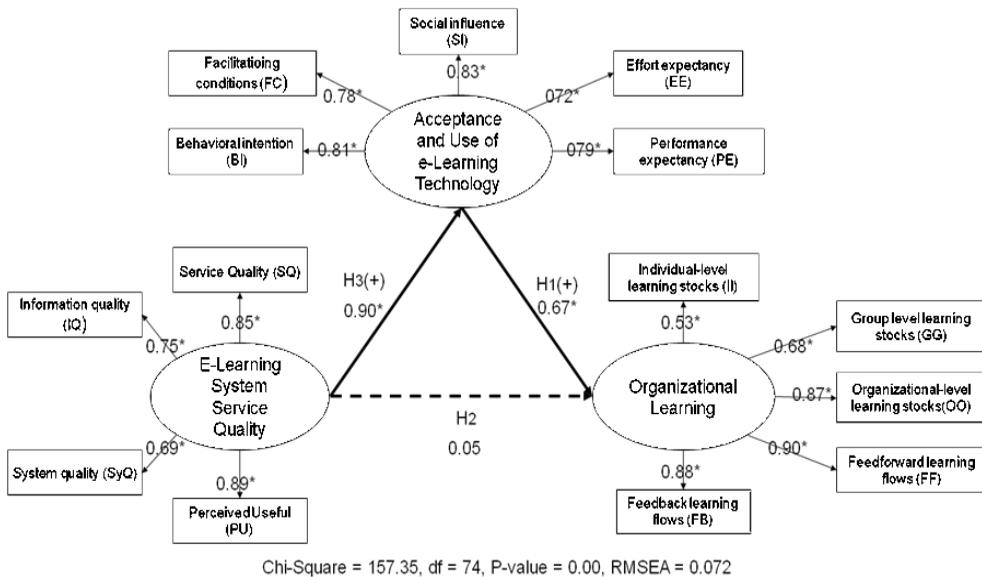


Figure 2. SEM Analysis of the Research Model

5. DISCUSSION AND CONCLUSIONS

This study examines the relationships among “acceptance and use of e-learning technology,” “e-learning system service quality,” and “organizational learning” from the end-users’ perspective (Figure 2). The significant direct effect of “e-learning system service quality” on “acceptance and use of e-learning technology” (H₁) and “acceptance and use of e-learning technology” on “organizational learning” (H₃) indicate that the quality of technology service, together with e-learning satisfaction, will affect the results of organizational learning (Figure 2). The results of this study agree with related study results [Daghfous, 2004; Janson, Cecez-Kecmanovic, and Zupancic, 2007]. Therefore,

e-learning and human resources professionals should take e-learning system service quality into consideration in designing and delivering e-learning courseware in order to enhance organizational learning results.

The results of this study suggest that e-learning plays an important role in transforming an organization into a learning organization, and that e-learning is an important tool for accelerating the effectiveness of organizational learning. Study results also show that “acceptance and use of e-learning technology” has a significant positive effect on organizational learning. With regard to employee satisfaction, results show that employee will be more interested in using e-learning if the system is able to provide them with useful information for their functions and is highly usable as well, both of which factors will increase employee satisfaction. In order to boost the willingness of employees to use the e-learning system, it is essential that overall e-learning training needs be aligned with the daily operations of employees and that a good user interface be designed to make it easy for them to use e-learning technology for learning.

Our results for Hypothesis 3 are consistent with the results of Landrum et al. [2008] and Wu and Wang [2007]. Our study confirms the positive relationship between the “acceptance and use of e-learning technology” and “e-learning system service quality.” The results indicate that high “e-learning system service quality” enhances employee e-learning satisfaction. Based on these results, organizations, after successfully introducing e-learning infrastructure, should focus on e-learning management and service operations in order to improve “e-learning system service quality” and thus increase end-users’ e-learning satisfaction. The revised SERVQUAL scale, based on the Information System Success (ISS) model, is a useful tool for measuring e-learning service quality [Landrum et al., 2008]. The e-learning service department must bear a greater responsibility for increasing employee motivation, maintaining good relations, smoothing communication and reaction channels, and showing a willingness to help the staff.

With regard to Hypothesis 2, our study found that “e-learning service quality” has no significant direct impact on “organizational learning.” Our findings in this regard differ from the results of Bhattacharjee [2001], who found that “e-learning service quality” has a significant direct effect on “organizational learning.” In our study, “e-learning service quality” has a significant *indirect* effect on “organizational learning.” Further study is encouraged to verify and better understand the relationship between these two constructs.

Our study shows that the direct influence of organizational learning effectiveness is e-learning user satisfaction, “acceptance and use of e-learning technology,” not “e-learning service quality.” The satisfaction of using e-learning technology plays a full mediating role in the relationship between e-learning system service quality and organizational learning effectiveness. Although our results indicate that e-learning system service quality has no direct influence on organizational learning, human resources and IT professionals should work together and take action to improve “e-learning system service quality” in order to increase e-learning technology satisfaction and to boost organizational learning effectiveness.

Although the results of this study fail to support Hypothesis 2 (“E-learning system service quality has a positive effect on organizational learning”), the results do confirm the direct and indirect relationship among e-learning technology satisfaction, quality of e-learning service, and organizational learning. Many empirical studies support the idea that e-learning technology is the best way to enhance organizational learning effectiveness. Organization, therefore, should provide high-quality e-learning service as the essential building block for better e-learning technology satisfaction in order to improve organizational learning effectiveness.

6. RESEARCH LIMITATIONS

This study has several limitations. First, since the sample (end-users) was drawn from different companies, cultural differences might be a factor in affecting the results of the study. Users, therefore, may vary considerably from culture to culture in satisfaction and e-learning technology acceptance and use. Second, after the initial contacts, only 15 out of 55 e-learning companies certified by the E-Learning Quality Certification Center agreed to participate in this study. This small participation rate may limit the generality of the study. Furthermore, we suggest that future research expand the scope and quantity of the survey and in order to achieve an even better model validation. Another point worth considering is further exploration of the sub-construction of various dimensions. For example, future research might explore the direct or indirect relationship between e-learning service quality and the three parts of the hierarchy of organizational learning (individuals, groups, and organizations).

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