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The Effects of Gender Differences, Learner Sources, and Online Interaction on Learners' Perceptions of E-learning

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ABSTRACT

With the maturity and propagation of multimedia and Internet technologies, E-learning has become popular and served as a key source for educational training and individual's competence development in the information society. Understanding and responding to learner's expectations is very important for the success of E-learning programs, especially with dramatic environmental changes and increasing competitive pressures. Educators need to adjust their instructional methods to increase education performance and meet learner's needs under limited financial and human resources. The purpose of this study focuses on investigating the effect of gender differences, learner sources, and online interaction on learner perceptions of service quality, information quality, and satisfaction. Conducting through a field survey, subjects are from the students in National Sun Yat-Sen Cyber University (<http://cu.nsysu.edu.tw>) in Taiwan. The findings contribute information to help in planning, design, development, implementation and evaluation of E-learning programs to better meet the demand of E-learning learners.

Keywords

E-learning, gender differences, learner sources, online interaction, service quality, satisfaction.

INTRODUCTION

Education is the foundation of a nation's survival; it has the great responsibility and mission of developing its human resources. By motivating learners, educators expect to cultivate self-directed learning ability of learner, culminating in lifelong learning (Keeling et al., 1998). Adult continuing education is an important component of lifelong learning, however, usually because of the restrictions of time and distance, the adult learner finds it difficult to attend traditional classes. In recent years, improvements in the educational structure provide adult learners with more diverse educational opportunities. The proliferation of multimedia and Internet communication technologies, also drive the new wave of learning.

E-learning is based on the Internet platform. This new way of learning offers a more flexible channel of knowledge communication and information sharing. The superior characteristics of the Internet overcome the distance and time limitations of traditional classroom teaching. Thus, the learner can surf the Internet to learn any time or at any place, and communicate asynchronously or synchronously with classmates or teachers. E-learning programs have become popular and a key source of training and developing people's competence in the information society. Moreover, E-learning has influenced the traditional pedagogy and introduced new ideas and opportunities for promoting lifelong learning.

The Internet has also transformed thinking about traditional education. Educators and researchers once believed that self-directed learning motivation is more difficult to stimulate and maintain in the E-learning environment. According to Moore's Theory of Transactional Distance (1986), physical distance creates a communication gap, which is a psychological space for potential misunderstandings between instructors and learners. The transactional distance problems in the E-learning environment are more pronounced than in traditional classroom teaching and constitute a barrier to learning that can only be overcome by effective information communication and support services. Therefore, learners will be more dependent on the quality of information and services that are provided by an E-learning system.

Moreover, learners are now finding that E-learning can bridge the gap between school education and management practice. The learning paradigm has shifted from teacher- to learner-centred. Educators and educational institutions need to focus on students' needs, and improve the quality of their teaching in order to satisfy and motivate learners (Clewes, 2003). Besides, facing increased competitive pressures and environmental changes, educators need to improve educational performance and meet learners' expectations. However, the key challenges of educators and education institutions are recognizing the characteristics and needs of learners.

Previous studies have adopted the view of the student as customer, and learning as consumption (Clewes, 2003). The customer always evaluates service quality as the determining factor of behavior intention in service encounters. From this viewpoint, the best way to meet learning goals is to determine and meet the needs and wants of target markets effectively and efficiently. More accurately, the key to providing superior service is understanding and responding to customer expectations. Educators and educational institutions must find ways to increase the satisfaction of their students by the process of teaching differentiation even with limited financial and human resources. Moreover, the educators and education institutions should pay more attention to students' demands, and improve teaching quality.

Many issues may affect learners' expectations and perceptions. This article concentrates on the effect of gender differences, learners' characteristics, and online interaction. This study has three objectives. First, there have been numerous studies on the design and development of E-learning platform or materials, but less attention has been paid to service perspectives.

Second, E-learning environments not only overcome the barriers of time and distance, but they also offer anonymity, online interaction, and variety of learner sources. These properties have made it popular and successful. Also, researchers emphasized that diversity of learner sources and online interaction distinguish E-learning from traditional classroom teaching (Piccoli et al., 2001). Marketing literatures have shown that different stakeholders have varying perceptions (Berry and Parasuraman, 1997), however, E-learning related research has overlooked this point. Besides, psychology research into gender differences in decision making shows that men and women conduct schematic processing differently (Gefen and Straub, 1997; Viswanath et al., 2003). It also will be interesting to explore the effect of individual differences on E-learning.

This study hopes to discover the discrepancies in the perception of E-learning, and suggest ways to capitalize on these effects to the benefit of learners. In other words, how do gender differences, learner sources, and online interaction affect the perception of service quality, information quality, and satisfaction? To teach students in a way that is consistent with their ability has always been the goal and vision of educators. E-learning has the great potential to achieve this goal. Therefore, by understanding the major discrepancies among learners, educators and educational institutions should ensure the satisfaction of learners' needs. This paper will assist educators in improving E-learning effectiveness and realizing the vision of lifelong learning.

THEORETICAL BACKGROUND

E-learning

E-learning, online learning, or web-based learning refers to integration with Internet and communication technologies, multimedia technologies, computer software and hardware systems to support human learning processes. The instructional methods of E-learning possess the characteristics of interactive communication between learners and instructors, active learning and collaborative learning, which has been a trend of modern education (Roffe, 2002; Zhang and Zhou, 2003).

E-learning, as Rosenberg (2001) emphasized from performance perspectives, can enhance learner' skill, knowledge, and performance through a broad array of online training and knowledge management related solutions. Further, Clark and Mayer (2003, p.14) describes the goal of E-learning as "to build job transferable knowledge and skill linked to organizational performance or to help individuals achieve personal learning goals."

Clark (2000) stated three views of E-learning course design including learning as information acquisition, learning as response strengthening, and learning as knowledge construction. Different courses may reflect different assumptions of learning, as Clark (2000) supposes, information acquisition type of E-learning focus on providing a great deal of information with limited practice opportunities, whereas view of knowledge construction concentrates on providing job-realistic problems and supporting resources. The benefits of E-learning, as studies pointed out (Clark and Mayer 2003; Roffe, 2002; Rosenberg, 2001; Zhang and Zhou, 2003), include cost-effectiveness, independent of time and place, responsiveness and currency, interactivity, and personalization.

Service quality

Service refers to the consequent action for satisfying customers' needs and achieving the goal of profit. In general, most service is intangible, heterogeneous, and inseparable, moreover, difficult to evaluate. Parasuraman, Zeithaml, and Berry (PZB, 1985) suggest that service quality is the consumer's long-term evaluation about overall service, which result from a comparison between consumer expectations and actual service performance, evaluating should includes all the methods, processes, and outcomes of service delivery. After summarizing many studies about service quality, PZB proposed the concept gap model of service quality whereas consumers' quality perceptions are influenced by a series of four distinct gaps occurring in organizations. Zeithaml, Berry, and Parasuraman (1988) developed their model further and defined perceived

service quality as “the difference between consumer expectations and perceptions, which in turn depends on the size and direction of the four gaps associated with the delivery of service quality on the marketer’s side” (p.36).

A large number of related studies have been made on service quality since PZB’s (1985) research. In their 1988 empirical research, PZB developed a 22-item instrument, SERVQUAL, to measure the perceived service quality by evaluating consumers’ expectations and perceptions of the five dimensions, including Reliability, Assurance, Tangible, Empathy, and Responsiveness. Four or five numbered items are used to measure each dimension.

Service quality has become an important research topic since numerous studies have shown that service quality influences profitability, customers’ satisfaction and customers’ behavior intention. SERVQUAL is among the most popular instruments for measuring service quality. At the same time, the SERVPERF instrument proposed by Cronin and Taylor (1992) evaluates consumers’ perceived performance. In their research, Cronin and Taylor found that SERVPERF possessed better predictive power than SERVQUAL. Nevertheless, PZB (1994) argued that from a practical viewpoint, SERVQUAL is preferred to SERVPERF because its superior diagnostic value more than offsets the loss in predictive power.

Information quality

With the maturity and progress of storage techniques, as Lee et al. (2002) pointed out, sifting necessary information from diversities and large quantities of information sources, becomes more complex and difficult for individuals or organizations. Well information quality influences organizational decision-making and performance, moreover, information quality has also become an important topic within management practice and MIS research disciplines. DeLone and McLean (1992) proposed the Information Systems success model and supposed that information quality affects the extent of usage and user satisfaction of IS. A large number of studies tested DeLone and McLeans’ model and reaffirmed the finding that well information quality is an essential factor for IS success. And with the popularity and currency of information via the Internet, information quality is an important foundation for building trust relationships between customer and EC website. Moreover, information quality also affects the customers’ satisfaction and behavior intention.

Satisfaction

Satisfaction is a psychological reaction to a purchase decision or product after purchase. The concept of customer satisfaction theory derives from the expectation-disconfirmation model proposed by Oliver (1977, 1980). Oliver (1980) stated that satisfaction is a summary psychological state resulting from emotions surrounding disconfirmation or confirmation of the consumer’s expectations or prior feelings of a service and thoughts about the actual consumption experience. Churchill and Surprenant (1982) further stated that satisfaction is an outcome of purchase and use resulting from the buyer’s comparison between the rewards/costs of the purchase and anticipated consequences. According to Oliver’s (1977, 1980) research, disconfirmation occurs when product performance is below expectations and results in dissatisfaction, whereas satisfaction arises when performance equals or exceeds expected performance. Oliver carried out a series of satisfaction related studies and found that satisfaction is a function of customer expectation and disconfirmation, moreover, satisfaction ultimately affects individual attitude toward future consumption behavior.

RESEARCH METHODOLOGY

Research model and hypotheses

Based on the research purpose and theoretical background, this study proposes a research model depicted in Figure 1. The research is designed to examine the effects of gender discrepancies, learner sources, and online interaction on the learner’s perceptions of service quality, information quality, and overall satisfaction.

Gender effects in Information Technology (IT), as Researchers have found (Gefen and Straub, 1997; Viswanath et al., 2003), women and men would respond in different ways to IT includes in IT perception and use. Gefen and Straub argued gender differences are one aspect of the overall cultural differences existing between human beings, which influence perceptions and behaviors included in computer-based communications media choice. Psychological researches that studied gender differences in decision-making processes have also shown that schematic processing by women and men is different. Moreover, previous observations noticed that men’s relative tendency to feel more at easy with computers. Thus, we have the following hypotheses:

H₁: Men will perceive the service quality of E-learning higher than women will.

H₂: Men will perceive the information quality of E-learning higher than women will.

H₃: Men will perceive the satisfaction of E-learning higher than women will.

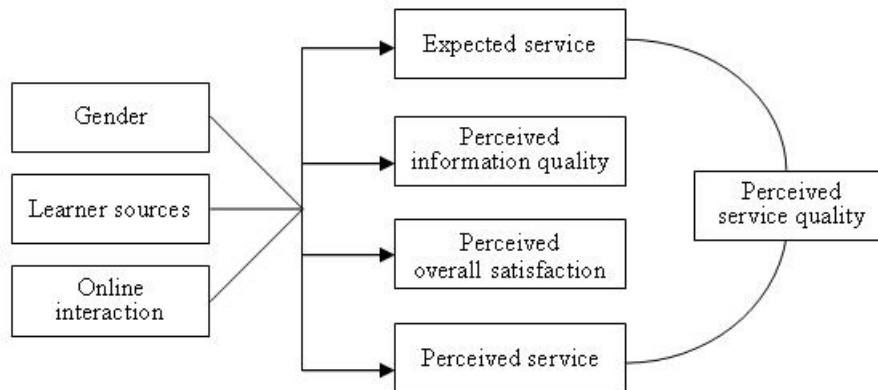


Figure 1. Conceptual Research Model

Researchers emphasized that diversity of learner sources and online interaction are significant characteristics distinguish E-learning from traditional classroom teaching (Mehrotra et al., 2001; Piccoli et al., 2001). According to Oliver's expectation-disconfirmation model (1977, 1980), expectation and satisfaction for products will arise when customers consume a great deal of efforts to obtain the desirous of products. The efforts of working adult students are relatively more than full time students, especially in the consumption of time and money (Keeling et al., 1998). Hence, we propose the following hypotheses:

H₄: Working adult students will rate the perceived service quality of E-learning to be higher than full time students.

H₅: Working adult students will rate the perceived information quality of E-learning to be higher than full time students.

H₆: Working adult students will rate the perceived satisfaction of E-learning to be higher than full time students.

From a viewpoint of user participation, as McKeen and Guimaraes (1997) supposes, more the extent of user participation, more the perception of system satisfaction, moreover, contributing to Information Systems success. Online interaction is a behavior that learner' active involvement or participation, many researches (Clark and Mayer, 2003; Piccoli et al., 2001; Roffe, 2002; Zhang and Zhou, 2003) revealed that online interaction affects students' motivation and academic performance. According to Moore's Theory of Transactional Distance (1986), students who participated in more online interaction will have less transactional distance between them and instructors or other students. Hillman (1994) pointed out that distance education should have four types of interaction includes learner-instructor, learner-learner, learner-content, and learner-interface. By increasing all type of online interaction that mentions above, students can be raised to active learning and cooperation learning abilities. This leads to the following hypotheses:

H₇: Learner with high online interaction will rate the perceived service quality of E-learning to be higher than those with low online interaction.

H₈: Learner with high online interaction will rate the perceived information quality of E-learning to be higher than those with low online interaction.

H₉: Learner with high online interaction will rate the perceived satisfaction of E-learning to be higher than those with low online interaction.

Measures of the constructs

The criterion variables include service quality, information quality, and overall satisfaction. Service quality was measured by IS SERVQUAL, which adapted from Kettinger and Lee (1994) revised PZB's (1988) original measure. Moreover, we refer to Pitt et al. (1995) research to make the semantic modification of statements according to the context setting of E-learning. For example, we modified the measurement items of Tangible dimension as up-to-date software and hardware, physical network relevant facilities, screen displays, and service relevant materials and so on. The survey instrument "IS SERVQUAL," according to PZB's definition, includes Tangible, Reliability, Responsiveness, Assurance, and Empathy, using seven-point Likert-type scales with anchors ranging from "strongly disagree" to "strongly agree."

Information quality was also measured in terms of seven-point Likert-type scales that capture the degree of information provided by E-learning, measured by six attributes including relevant, understandability, reliable, adequate, scope, and useful. These attributes represent some of the most extensively studied attributes of information in the IS research literature (e.g., Bailey and Pearson 1983, McKinney et al., 2002). Besides, we measured overall satisfaction with four items, and respondents rated their satisfaction with E-learning on a seven-point semantic scale, with higher scores indicating greater satisfaction.

The predictor variables include gender, learner sources, and online interaction. According to the number of student identity cards within the sampled population, we distinguish full time students from working adult students. Moreover, face-to-face learning was excluded from the definition of working adult students. Online interaction was measured in terms of frequencies of logins, discussion, and postings, which were recorded by population frame. The extent of online interaction was separated into high, middle, and low levels by procedures, which first transformed these records into T scores, then ranked them from first to last, which ranged by 27% referring to discrimination approach. The items used in the scale are listed in Table 1.

Construct	Definition	Reference
Service Quality Dimension:		
Tangible	Up-to-date software and hardware, physical facilities, screen displays, and service relevant materials	Kettinger and Lee, 1994; Pitt et al., 1995; PZB, 1988;
Reliability	Ability of E-learning services to perform the promised service dependably and accurately	
Responsiveness	Willingness of E-learning services to help learners and provide prompt services	
Assurance	Ability of E-learning services to convey trust and confidence	
Empathy	Ability of E-learning services to provide caring and individual attention	
Information Quality Dimension:		
Relevant	Information is relevant to your leaning	Bailey and Pearson, 1983; McKinney et al., 2002; Pitt et al., 1995;
Understandability	Information is understandability for your learning	
Reliable	Information is reliable for making your learning	
Adequate	Information that is adequate for your learning	
Scope	Information that covers a broad scope for your learning	
Useful	Information that is useful for your learning	
Overall Satisfaction:	The degree of learner satisfaction with the E-learning	Oliver, 1980; Shu et al., 2002
Gender:	Male and female	Gefen and Straub, 1997
Learner Sources:	Full time students and working adult students	Rigotti and Pitt, 1992
Online Interaction:	frequency of logins times, discussion times, and postings times	Piccoli et al., 2001; Lu et al., 2003

Table 1. Construct Definitions in E-learning Context

Sampling design and data collection procedure

Our questionnaire developed from pre-validated measures in previous related studies and used to collect the data for this study. A robust survey instrument was mailed to conduct quantitative analysis following a pilot test for ensuring well content validity. We collected the data from the National Sun Yat-Sen Cyber University (<http://cu.nsysu.edu.tw>) by mail survey in Taiwan. The target population uses a representative platform of a learning manager system (LMS), Wisdom Master (<http://www.sun.net.tw>), and conforms to the E-learning standard of SCORM 1.2. The sampling frame was chosen in terms of satisfying with classification of online interaction and gender from population. According to stratified random sampling

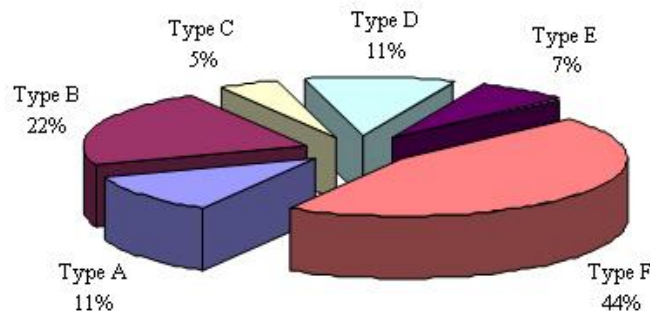
methods, this study distributed questionnaires to 1000 respondents in terms of proportion allocation approach. Two hundred forty usable questionnaires were returned, representing a response rate of 24%.

DATA ANALYSIS AND RESULTS

Samples statistics

A test for non-response bias was conducted that early responders were compared with late responders in term of variables under study. No significant differences in means were found, which were revealed that the samples possess excellent representative of population, and belonging to a random subset of the sampling frame.

Frequencies of learner source and online interaction are depicted as Figure 2, which conform to the proportion of population structures. The results also show most of the E-learning members are belonging to working adult students with high online interaction, corresponding to the E-learning characteristics of crossing the distances and diversities of learner community.



Note:

Type A = full time students with low online interaction

Type B = full time students with middle online interaction

Type C = full time students with high online interaction

Type D = working adult students with low online interaction

Type E = working adult students with middle online interaction

Type F = working adult students with high online interaction

Figure 2. Descriptive Statistics of Learner Sources and Online Interaction

Reliability and Validity

To establish the convergent and discriminant validity of the multiple-item scales, confirmatory factor analysis (CFA) conducting by the AMOS software was used on SERVQUAL. Using the maximum likelihood method and accompanying the item covariance matrix as input, the model estimation of CFA was presented in Figure 3, exhibiting an acceptable model fit. The χ^2 of 539.655 with 204 degrees of freedom showed a χ^2 to degrees of freedom ratio of less than the recommended 1:3. The NFI at .847, CFI at .898, and RMSEA at .083 are all within the commonly accepted thresholds for CFA. Only the RFI at .827 was below the .90 benchmark. Moreover, all the estimated coefficients in Figure 3 also showed the significant result at .001 level. Besides, not only SERVQUAL but also other constructs met the criteria of reliability and validity. Complete reliability and validity results are available upon request from the authors.

Hypotheses testing

Not violating the assumptions underlying multivariate analysis included normality, independence, and equality of variance-covariance matrices, this study test further our hypotheses by MANOVA statistical technique. Phillai's Trace, Wilks lamda, Hotelling's Trace, and Roy's Largest Root all have shown that without interaction effects among predictive variables in our study. The results were reported in Table 2. Most of hypotheses were supported; further discussion and implications will be presented in the next section.

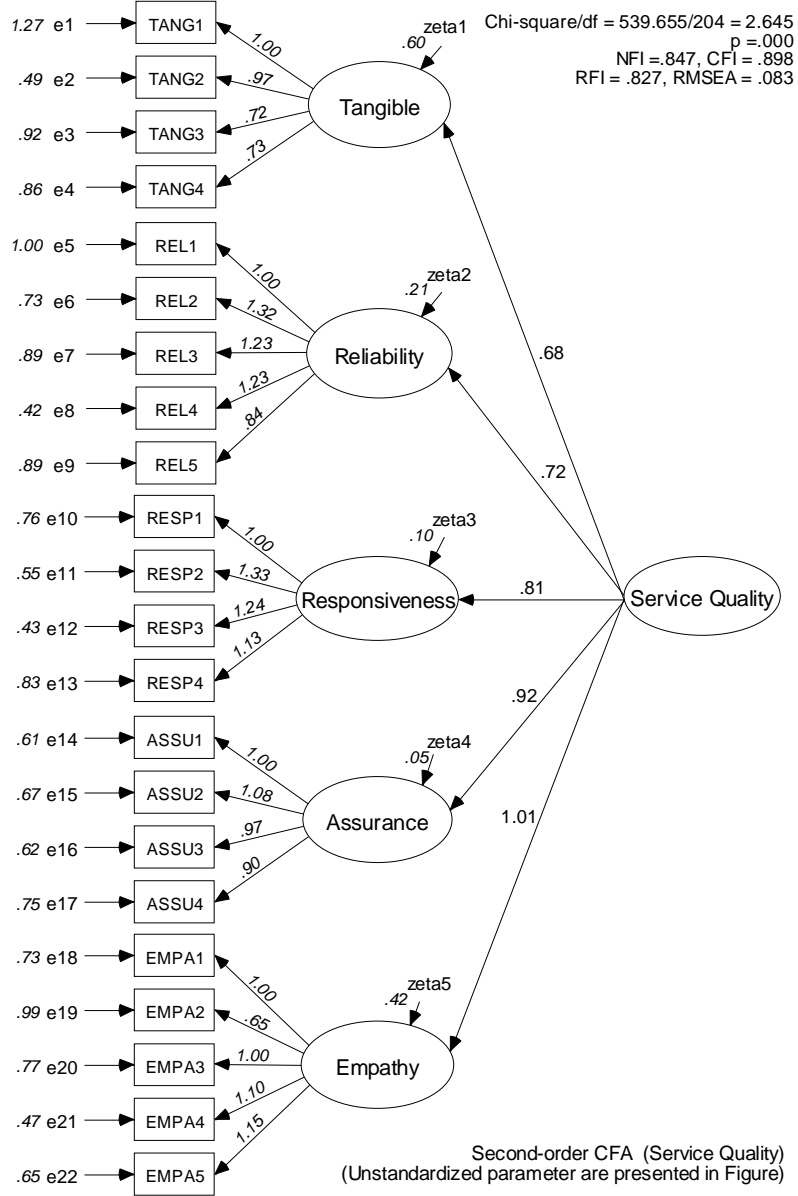


Figure 3. Second-order CFA for Service quality

Source	SS	df	F	Posteriori comparisons	Hypotheses
Gender					
Tangible	4.41*	1	4.47	Men > women	} H ₁ : supported.
Reliability	6.72 *	1	6.36	Men > women	
Responsiveness	7.75 *	1	6.57	Men > women	
Assurance	7.38 **	1	7.26	Men > women	
Empathy	3.14	1	1.96		
Perceived SQ	128.71*	1	6.42	Men > women	} H ₂ : supported.
Information Quality	6.77 **	1	9.60	Men > women	
Overall Satisfaction	5.63 **	1	7.35	Men > women	H ₃ : supported.
Learner Sources					
Tangible	1.29	1	1.29		} H ₄ : not supported.
Reliability	1.88	1	1.74		
Responsiveness	0.69	1	0.57		
Assurance	0.83	1	0.79		
Empathy	0.17	1	0.10		
Perceived SQ	21.65	1	1.06		} H ₅ : supported.
Information Quality	4.98 **	1	6.98	Working adult students > full time students	
Overall Satisfaction	5.98 **	1	7.82	Working adult students > full time students	H ₆ : supported.
Online Interaction					
Tangible	4.21	2	2.12		} H ₇ : marginally supported.
Reliability	3.78	2	1.76		
Responsiveness	6.06	2	2.54		
Assurance	7.03 *	2	3.44	High online interaction > low online interaction	
Empathy	0.06	2	0.02		
Perceived SQ	62.04	2	1.52		} H ₈ : supported.
Information Quality	4.96 **	2	3.46	High online interaction > low online interaction	
Overall Satisfaction	7.66 **	2	5.03	High online interaction > low online interaction	H ₉ : supported.

* $p < .05$. ** $p < .01$.**Table 2. ANOVA Results of Research Model**

DISCUSSION AND IMPLICATIONS

This paper examines the extent to which gender discrimination, learner sources, and online interaction affect learners' perceptions of service quality, information quality, and satisfaction. The result shows that these discrepancies have a significant effect on learners' perceptions. Strong support for gender effects was found in our samples; the perception of service quality dimensions, information quality, and overall satisfaction among women learners were significantly lower than they were in men. Women learners might be finding it more difficult to adapt to the more masculine system operation or screen displays in the E-learning environment developed by Wisdom Master LMS. This finding suggested the need for system developers or designers to bridge the gender perception gap by teaching auxiliary tools or interfaces that accommodate gender differences. For example, an agent mechanism can assist women learners to retrieve, search, and consult course-related information, and minimize psychological obstacles.

Our results also find that working adult students have more positive perceptions of overall satisfaction and information quality than full time students do. Although this result shows the right expectation in the goal of promoting lifelong learning, however, it also exhibits the problem of neglecting the demand of full time students in designing an E-learning environment. Our finding is need to awareness that full time students lack for motivation and intention in identifying with the present E-learning system. Full-time students not only have the opportunity for traditional face-to-face teaching but also can choose E-learning as an alternative. Therefore, what is the role and orientation of E-learning for full time students? Can E-learning complement classroom teaching or replace some teaching content? The different role and orientation also affect the functionality design and service content of E-learning. In other words, the function and value of E-learning may become insignificant if educators and educational institutions neglect this fact. Based on this finding, we recommend that educators may clarify the role and orientation of E-learning for full time students.

Moreover, the extent of online interaction influences learners' perceptions of service quality, information quality, and satisfaction. The learner with high online interaction has more positive perception of overall service quality, especially in the dimensions of Assurance. Besides, the learner has a more positive perception of information quality and overall satisfaction. This finding suggested that educators and educational institutions should strengthen the interactions between learner and instructor, and between learner and system, by using online discussions, chat rooms, bulletin boards, and other virtual activities which increases learner's participation. Strengthening the interaction can promote students' learning motivation, and increasing their satisfaction.

The question of whether web service quality measure should include a Tangible dimension is still controversial. Kettinger and Lee (1994) have found that the Tangible dimension was insignificant in measuring IS service quality; on the contrary, Kettinger et al. (1995) showed that the Tangible dimension was retained in the Hong Kong and Korean samples. Therefore, Kettinger et al. suspected the existence of an "Asian Factor" that may be explained by cultural or other differences. Our findings support that the Tangible dimension was significant in measuring E-learning service quality. However, it still lacks support for the proposed "Asian Factor" because we modify the questionnaire statements of Tangible dimension to suit the E-learning context. In fact, research has shown that quality of system interface and document affect the presentation quality of information. We may proceed to the conclusion that enhancing the Tangible dimension of E-learning system, including update of hardware and software, presentation of system interface, and quality of relevant service documentation will increase learners' satisfaction and identity with E-learning.

This study contributes both to management practice and academic research. One contribution of this paper is that it begins to fill a gap in the E-learning service quality literature, and can allow educators and educational institutions to improve their performance. Moreover, Internet environments can offer E-learning new potential by enabling personalized, interactive, current, and user-centric learning characteristics. The results might therefore provide information to guide the planning, design, development, evaluation, and implementation of programs to meet the needs of E-learners.

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