DL-sQUAL: a multiple-item scale for measuring service quality of online distance learning programs*

Naj Shaik, *University of Illinois Urbana-Champaign, Urbana IL, USA*
Sue Lowe, *Virginia College Online, VA, USA*
Kem Pinegar, *Virginia College Online, VA, USA*

ABSTRACT. Education is a service with a multiplicity of student interactions over time and across multiple touch points. Quality teaching needs to be supplemented by consistent quality supporting services for programs to succeed under the competitive distance learning landscape. ServQual and e-SQ scales have been proposed for measuring quality of traditional and e-commerce services. Currently there are no instruments available to measure the quality of distance learning services. With the growing demand for online education there is a need for an instrument to measure the quality of online distance learning services. This study addresses the gap by identifying the dimensions and the service quality scale (DL-sQUAL) of online distance learning programs.

KEYWORDS: Evaluation research, Online education, Quality measure instruments, Quality supporting services, Research results

Introduction

Internet has created a new level of competition among distance learning institutions, and the entry of fast growing dot.com companies complicates the competitive landscape. Internet has also empowered students who now expect a service-driven value chain encompassing personalized attention, real-time responsiveness and consistent guidance at every touch point during their stay at the institution. This gradual transformation of the distance education landscape has brought the issue of quality of educational services to prominence. Institutions are interested in determining how services can be leveraged to increase competitive advantage as part of distance learning marketing strategy.

Significance of distance learning service quality

Academic Institutions have developed and utilized diverse measures to assess the quality of education. Program evaluation questionnaire administered to seniors prior to graduation, alumni survey, and course evaluation questionnaire administered at the end of each course are the primary sources of student assessment data. Data from the program evaluation questionnaire are compiled to produce summary reports for the administrative units to draw conclusions about the efficacy of the program. Alumni surveys are administered to collect program-specific information by individual departments. Instructor and course evaluation questionnaire typically view courses as a series of discrete classroom encounters to be evaluated in isolation with the rest of institution's services and does not provide a complete view of educational service quality. Besides, the data from the instructor and course evaluation questionnaire are compiled to develop a longitudinal profile of the instructor for possible use in the tenure and promotion process. Program evaluation questionnaire, alumni survey, and the course evaluation questionnaire are not designed to address the issue of service quality even though the data from these assessment instruments is often used to make inferences about student's satisfaction with educational services. Satisfaction is generally associated with a single transaction whereas service quality is based on the cumulative assessment of the quality of services rendered over time (functional quality) and the outcome resulting from those services (technical quality). Education is a service characterized by intangibility, perishability, inseparability and heterogeneity, and students are the prime focus of the institution. Education services constitute core and supporting services. Teaching and learning that occur in the class are examples of core service because it is critical to a successful learning experience. A number of supporting services include real-time information about institutional policies, procedures and courses, student advising, registrations, orientation, student accounts, help-desk, complaint handling, feedback, and student placement. Students regularly come into contact with the staff associated with these services during their stay at the institution. These services create added value to the student and determine the quality of students' learning experience. It is increasingly becoming clear that having internationally renowned faculty is not sufficient. Quality teaching

supplemented by quality supporting services has become a key differentiator in the highly competitive distance learning landscape (Shaik, 2005). It is useful to assess not only student perceptions of their educational outcomes (technical quality) but also their perceptions of the manner in which educational services were provided for the duration of their stay (functional quality) at the institution. To do so, distance learning administrators need answers to a number of questions such as:

• What constitutes good distance learning services by students?

• What are the underlying dimensions of quality distance learning services scale?

• How can such a scale be conceptualized, measured, and assessed?

• What actions should be taken to deliver quality services?

• What role will different campus entities play in creating a unique learning environment for the students?

Purpose

The primary purpose of this study is to provide a practical basis for measuring distance learning service quality (DL-sQUAL) by developing a psychometric-based questionnaire.

Research objectives

This study is designed to address the following research objectives:

• Develop a definition for distance educational service quality based of literature review

• Identify the dimensions associated with DL-sQUAL scale

• Verify the reliability and validity of the DL-sQUAL scale

• Identify the relative importance of distance learning processes

Research questions

This study is designed to answer the following research questions:

• What key factors should be included in the DL-sQUAL scale?

• Does the DL-sQUAL scale demonstrate internal reliability?

- Does the DL-sQUAL scale demonstrate construct validity?
- Which of the key factors contributes to the overall impact?

Brief literature review on service quality

For manufacturing products quality is defined in terms of objective criteria such as the product conforming to requirements or the product is free from all known defects. However such objective measures are difficult to translate into methods for assessing service quality. Based on services theory, Parasuraman, Zeithaml and Berry developed ServQual as a generic scale with ten dimensions to measure the inter-personal nature of service encounters in face-to-face service interactions. Extension of their research to a number of face-to-face service domains resulted in refinement of the ServQual scale to 22 items and five dimensions: reliability, responsiveness, assurance, empathy and tangibles. ServQual has been criticized on theoretical and operational grounds but it has since then moved towards institutional status. The growing popularity of Internet e-commerce once again brought to focus the issue of measuring e-service quality. Since ServQual was conceptualized to capture the interpersonal nature of service encounters applicable to most of traditional services, it was soon realized that ServQual cannot capture the special nature of customer e-service interactions (Parasuraman et al., 1988). This led to the development of e-SQ instrument (Parasuraman et al., 2005). Both ServQual and e-SQ scales are grounded in the services theory (Grönroos et al., 2000). A different approach to measure e-services quality is taken by researchers in Information Systems (IS) and web quality theory to examine data quality, information quality, software and system quality, documentation quality, information systems service quality, and global information systems quality function.

A number of researchers have evaluated the quality of site-based educational services using variations of the ServQual instrument (Holdford, Reinders, 2001; Sherry et al., 2004). Unfortunately the ServQual, e-SQ, and web quality instruments are not directly applicable to emerging online educational environments. A major limitation of IS research is that it focuses mainly on the perspectives of web designers and developers. Distance learning is like a complex mosaic. Service encounters similar to the face-to-face service

interactions in business and online service encounters resembling Internet e-commerce constitute portions of the distance learning mosaic. These instruments do not capture the vast majority of service encounters that take place in various learning spaces which are critical to the student's learning experiences. A recent survey of the literature indicates absence of a psychometrically based instrument to measure the quality of distance learning services. A validated instrument with established psychometric properties reduces the need for redundant research design. It provides researchers with an instrument that can be applied across different samples and settings. From a broader research perspective, development of a validated instrument with strong psychometric properties will enable researchers to move beyond the "What" question to "Why" questions. A valid and reliable measure of a distance learning service quality also has significant diagnostic potential. It can be used to identify interventions and provide information to guide interventions aimed at increasing better learning experiences for distance learning students. There is also a renewed interest in the measurement of service quality in distance learning and service encounters are seen as a management imperative. There are currently no published studies that propose a measure for services quality in online distance learning interactions. This study represents a first attempt at addressing this gap.

Sample design & Data collection

The educational program that served as the setting for this development activity is a distance learning institution located in the south-eastern region of United States. Students were informed about the voluntary nature of their participation. The questionnaire was administered through WebCT to graduate and undergraduate students over a two-week period. A total of 180 students completed the online questionnaire meeting the recommended conservative respondent to item ratio of 5:1 for initial scale development. The gender male to female ratio is 15% and 85%. Majority of the students (59%) in this sample are above 30 years and older, and 39% are less than 30 years old. A very small percent (3.5%) of the sample includes students enrolled for the first time at this institution. Majority of the students (95%) who completed the survey have been enrolled in courses over

multiple quarters and have a good understanding of the service encounters across the institutional processes. The sample is a fair representation of the overall student population at this institution.

Reliability & Validity analysis

Content validity based on sound theory is the first step in the scale development process (DeVellis, 1991; Nunnally, Bernstein, 1994). The services literature and service quality instruments developed by prominent researchers served as a guide to the initial selection of items and constructs. After the items had been generated and the form of the items and the response formats decided, the instrument was reviewed and evaluated by domain experts to optimize the content validity of the instrument by carefully evaluating each item in the scale for relevance, clarity, and conciseness. The primary method used was quantitative survey research consisting of a Likert scale questionnaire with four open-ended questions. A five-point Likert rating scale was used for the DL-sQUAL scale with choices "strongly disagree," "disagree," "neutral," "agree," and "strongly agree". All questions were positively worded because there is no consensus among researchers on the advantage of a mix of positively and negatively worded items. The open-ended questions were included to obtain additional information on issues that were not included in the questionnaire, but are considered important by the students. Perceptions of service quality, in general, are determined by evaluations of both technical and functional quality. The DL-sQUAL instrument has a "process-focus" and measures the functional quality, and only indirectly evaluates technical quality. Since students have strong opinion about their educational outcomes and use it to evaluate their overall experience at the institution three global questions on "Perceived Value" and "Loyalty & Commitment" were added to address the technical quality of the services.

Perceived Value	I am satisfied with the value of my education at this college.
Loyalty & Commitment	I would recommend this college to my family/friends.
Loyalty & Commitment	I would take another course offered at this college.

Construct validity deals with establishing the functional relationship among the variables. Due to the early stages of the instrument development process, exploratory factor analysis is used for construct validation because it does not make any assumptions about the number of factors and provides a more direct picture of dimensionality. Principal component analysis was used to assess the factor structure of items relating to the constructs. Kaiser's eigenvalue rule and Cattel's scree test was used to determine the appropriate number of factors to retain (Nunnally, Bernstein, 1994). After obtaining the initial set of factors varimax rotation was performed to produce a final orthogonal factor structure. Factor loadings of 0.3 or higher on a factor are considered interpretable, and 0.4 or higher are considered salient. For this study, a conservative lower bound value of 0.5 was used as to define the salient factor loading. The decision to retain an item was based on the value of the item structure coefficient greater than 0.5, and a minimum gap of 0.10 between salient coefficients on multiple factors. Next, an oblique transformation using the direct oblimin method was performed with deltas set at 0.1, 0.3, 0.5 and 0.8 to determine any improvements in the factor solution. The factor solution obtained by the varimax rotation was retained since there was no advantage to the simple structure and there was no additional information to assist in the interpretability of the solution based on the oblique rotation method (Nunnally, Bernstein, 1994). One of the goals in the instrument development process has been to identify a small number of items per scale that would not only yield high internal consistency and reliability estimates but also reduce the time required to administer the questionnaire. A number of iterations were performed using exploratory factor analysis on the initial set of 40 items to simplify the scale. Items that loaded on multiple factors were eliminated. Results of the exploratory factor analysis based on varimax rotation are listed in Table 1 and Table 2. The eigenvalue and scree plot procedure both identified a three factor solution with a 27.7%, 24.8% and 11.2% variance and a cumulative variance of 63.8%. The rotated loadings provided a clean factor structure with the exception of four items with weak cross-factor loadings. These items were retained because they represent services interactions important to the students. Additional analysis using oblique transformation did not improve the factor structure.

Reliability describes the precision, consistency and stability of a measuring instrument, and is considered as fundamental to the issue of scale measurement. Cronbach's coefficient alpha is used as a standard measure of reliability. The internal reliability coefficient ranged between 0.77 and 0.92. The overall reliability estimate for the 24-item combined scale was 0.90. All alpha estimates are in the acceptable range.

Construct	Description
Reliability	Promised service performed dependably and accurately.
Responsiveness	Willingness to help students and provide prompt service.
Assurance	Ability of staff and faculty to inspire trust and confidence.
Empathy	Care and individualized attention to students.
Competence	Possession of required skill and knowledge to perform service.
Courtesy	Politeness, respect, consideration and friendliness of contact personnel.
Access	Approachable and ease of contact.
Efficiency	It is easy and simple to complete any transaction with the institution.
Security	Student personal information is safe and protected.
Flexibility	Choice of ways to pay for charges.
Communication	Listens to and keeps the students informed.

Table 1. Constructs

		Factor Loadings		
Factor 1 (ISQ): Instructional Service Quality *(alpha=0.9)*		F1	F2	F3
1	The faculty clearly state what they expect of students in the course.	**0.8**		
2	The faculty is consistent in their grading practices.	**0.8**		
3	The college has qualified faculty.	**0.7**		
4	The faculty gives adequate feedback on student performance.	**0.7**		
5	Information on the college web site is accurate.	**0.7**		
6	The faculty treats students with respect.	**0.7**	0.4	
7	Toll-free phone number is available to contact staff for assistance.	**0.7**		
8	Faculty is fair in evaluating student grades.	**0.5**		
9	It is easy to find relevant information from the college web site.	**0.5**	0.4	
10	The college web site does not crash.	**0.4**		

Table 2. Exploratory factor analysis* for the DL-sQUAL scale

		Factor Loadings		
Factor 2 (M&AS): Management & Administrative Services *(alpha=0.9)*		F1	F2	F3
11	The college office staff shows interest in solving students' problem.		**0.8**	
12	The office staff is always courteous to students.		**0.7**	
13	The management is friendly to students.		**0.6**	
14	I feel safe in my online financial transaction using the college website.		**0.6**	
15	The management is approachable to resolve student concerns.		**0.6**	
16	The advising staff is polite.		**0.6**	
17	The college provides services to accommodate student's schedule.		**0.6**	
18	The help-desk staff who answer the phone are always polite.		**0.6**	
19	The admissions associates are courteous.	0.4	**0.5**	
20	It is easy to complete the registration using the web site.	0.4	**0.5**	
		Factor Loadings		
Factor 3 (COM): Communication *(alpha=07)*		F1	F2	F3
21	Office staff member contacts me if I miss my scheduled appointment.			**0.8**
22	It is not a hassle to get refund for dropping or withdraw from course(s).			**0.7**
23	Office staff member contacts me if I am not progressing in my course.			**0.6**

* Rotation method: varimax with Kaiser normalization; Cronbach's alpha reliabilities are listed in parenthesis

Multiple regression analysis

To determine the extent to which each DL-sQUAL dimension contributes to the overall impact, multiple regression analysis was conducted with the three factors as independent variables. The technical outcome variables, perceived value and loyalty were each treated as dependent variables. Summary results of the regression analysis are listed in Table 3. Results show that all the three factors have significant positive effects on loyalty and perceived value variables. The pattern shows that instructional services and administrative services have relatively stronger

effects. Students seem to view the encounters with faculty and supporting instructional services staff as contributing to the value of their investment. The data suggest that students' decision to enroll in future courses at this institution is based on their service encounters with management and administrative staff across the institution.

Independent Variables (Factor Scores)	Dependent Variable (Loyalty & Commitment)	Dependent Variable (Perceived Value)
Factor 1: ISQ	0.30 (t=3.2, p=0.0)	0.43 (t=5.0, p=0.0)
Factor 2: M&AS	0.33 (t=3.3, p=0.0)	0.23 (t=2.5, p=0.01)
Factor 3: COM	0.16 (t=2.4, p=0.01)	0.18 (t=2.9, p=0.0)
R 2	0.51	0.58

Table 3. Regression analysis of loyalty and perceived value on DL-sQUAL factors

Discussion

Majority of the students in this sample are adult female students and have been enrolled in courses over multiple quarters at this institution. They therefore have considerable experience with distance learning services at this institution. The sample is also a good representation of the overall student population at this institution in terms of gender, age distribution, and experience with institutional services. Two broad complex constructs emerged from the data analysis: Instructional Service Quality (ISQ) and Management & Administrative Services (M&AS). The instructional services represent mostly classroom experiences with the instructor and information on the college web site. The management and administrative services include services from college management, administrative staff, advisors, and help-desk. Students seem to broadly differentiate service encounters in the classroom from service encounters with the rest of the institutional staff. Students seem to view the encounters with faculty and supporting instructional services staff as contributing to the value of their investment. The data suggest that students' decision to re-enroll in courses at this institution is based on their service encounters with management and administrative staff across the institution. The third construct on Communication seems to be an artefact of this sample. With additional sample, it is likely that an improved factor structure would emerge.

Directions for further research

The DL-sQUAL scale demonstrates psychometric properties based on the validity and reliability analysis. The findings from this exploratory research offer useful initial insights about the criteria and processes students use in evaluating distance learning services. These insights, in addition to serving as a starting point for developing a formal scale to measure perceived DL-sQUAL, constitute a conceptual blueprint that distance learning administrators can use to qualitatively assess the potential strengths and weaknesses of their services. It also helps target specific service elements requiring improvement, and training opportunities for staff. Analyzed at the item level, data drawn from application of the DL-sQUAL instrument have practical implications for distance learning administrators.

This is an exploratory study with the goal of developing a DL-sQUAL scale. The scale should be viewed as a preliminary scale because the sample is limited to a single distance learning institution located in south-east part of United States and represents the service experiences of students at that institution. Due to the limited nature of the sample, the results of this study cannot be generalized beyond the specific sample domain. The generalizability of the results of this research study is also constrained by the absence of standardized data for comparison. There is a need for further research to broaden our understanding of the assessment, antecedents, and consequences of distance learning services quality. Future research based on longitudinal and cross-sectional data is needed to further examine the reliability and validity of the DL-sQUAL scale, enhance its psychometric properties, standardize the scale, and confirm the factor structure using structural equation modeling techniques.

References

DeVellis Robert F. (1991), *Scale development: theory and applications*, Newbury Park, CA, Sage Publications Inc.

Grönroos Christian, Heinonen Frederik, Isoniemi Kristina, Lindholm Michael (2000), *The net Offer model: a case example for the virtual marketspace,* "Management Decision", v. 38, n. 4, pp. 243 - 252

Holdford David, Reinders Thomas P. (2001), *Development of an instrument to assess student perceptions of the quality of pharmaceutical education*, "American Journal of Pharmaceutical Education", V. 65, n. 2, pp. 125-131

Hurley Amy E., Scandura Terri A., Schriesheim Chester A., Brannick Micheal T., Seers Anson, Vanderberg Robert J., Williams Larry J. (November 1997), *Exploratory and confirmatory factor analysis: guidelines, issues, and alternatives*, "Journal of Organizational Behavior", V. 18, n. 6, pp. 667-683

Nunnally Jum C., Bernstein Ira H. (1994), *Psychometric theory*, 3rd ed., New York, McGraw-Hill

Parasuraman A, Berry Leonard L., Zeithaml Valarie A. (1988), *SERVQUAL: a multiple-item scale for measuring service quality*, "Journal of Retailing", V. 64, n. 1, pp. 12-40

Parasuraman A, Zeithaml Valarie A., Malhotra Arvind (2005), *E-S-Qual: a multiple-item scale for assessing electronic service quality*, "Journal of Service Research", V. 7, n. 3, pp. 213-233

Shaik Najmuddin (2005), *Marketing distance learning programs & courses: a relationship marketing strategy*, "Online Journal of Distance Learning Administration", V. 8, n. 2
http://www.westga.edu/~distance/ojdla/summer82/shaik82.htm

Sherry Carol, Bhat Ravi, Beaver Bob, Ling Anthony (2004), *Students as customers: the expectations and perceptions of local and international students.* Proceedings HERDSA Conference, Curtin University of Technology, Miri, Sarawak, Malaysia, 4-7 July

Sintesi

L'educazione è un servizio con una molteplicità di interazioni tra studenti, nel corso del tempo e lungo punti di contatto multipli. Un insegnamento di qualità necessita di essere integrato da servizi di supporto di altrettanta qualità, affinché i programmi abbiano successo nel panorama del competitivo apprendimento a distanza. Sono state proposte le scale ServQual ed e-SQ, per misurare la qualità dei servizi tradizionali e la qualità dei servizi di e-Commerce. Attualmente, non ci sono strumenti sedimentati nella pratica didattica per misurare la qualità dei servizi di apprendimento a distanza, per cui data la crescente domanda di formazione on line, è sempre più necessario progettare strumenti per misurare la qualità dei servizi di apprendimento on line.

Lo scopo principale di questo studio, che cerca di colmare la lacuna, è quello di fornire una base pratica per misurare la qualità dei servizi di apprendimento a distanza (DL-sQUAL), sviluppando un questionario di tipo psychometric-based.

La ricerca si è proposta quattro principali obiettivi: lo sviluppo di una rassegna della letteratura basata sulla qualità dei servizi educativi a distanza; l'identificazione delle dimensioni associate con la scala DL-sQUAL; la verifica dell'affidabilità e della validità della scala DL-sQUAL; l'identificazione della relativa importanza dei processi di apprendimento a distanza. Tali obiettivi vogliono rispondere a parallele domande di ricerca: quali fattori chiave dovrebbero essere inclusi nella scala DL-sQUAL? La scala DL-sQUAL dimostra affidabilità interna? La scala DL-sQUAL dimostra la validità del costrutto? Quale dei fattori chiave contribuisce all'impatto complessivo?

Dopo aver preso in considerazione la letteratura dedicata alla qualità dei servizi ed aver illustrato la composizione del campione considerato (un'istituzione di apprendimento a distanza, situata nella regione sud-orientale degli Stati Uniti) e le modalità per la raccolta dei dati, vengono analizzati i criteri di Validità e Affidabilità con l'ausilio di alcune tabelle, in cui sono indicati i fattori ISQ (Qualità del Servizio Formativo), M&AS (Servizi Amministrativi e Gestionali) e COM (Comunicazione). Lo studio si conclude con un'analisi di regressione della Fedeltà e del Valore Percepito sui fattori DL-sQUAL.

Quello che sembra emergere dalle varie analisi incrociate è che gli studenti sembrano considerare gli incontri con il personale dei servizi formativi di supporto della facoltà come incontri che contribuiscono ad accrescere il valore del loro investimento. I dati suggeriscono infatti che la decisione degli studenti di re-iscriversi in corsi futuri presso l'istituzione campione è basata sui loro incontri di servizio con il personale gestionale e amministrativo dell'istituzione stessa.