VOL. 7, NO. 1, SEPTEMBER 2012, 13 – 33

Assuring the quality of online teaching and learning: The case of Wawasan Open University

Liew Teik Kooi
Wawasan Open University, Malaysia

Teoh Ai Ping
University Sains Malaysia, Malaysia

Abstract

The dynamic business environment and powerful market forces in the 21st century are challenging leaders at open universities to compete successfully in the national and global higher education stage. The notion of quality is becoming an important and overriding issue with the paradigm shift in the education landscape due to the rapid penetration of Internet usage. Open universities are experiencing pressure from numerous stakeholders to become more client-focused, particularly in their provision of technology-enhanced education to systematically support the learning experience of open distance learners. In the pursuit of establishing institutional and national/regional-based quality assurance practices, Asian open universities should pay particular attention to one of the key components within the overall QA framework; that is, the web-based teaching and learning on the online learning management system (LMS). The assurance of quality in the web-based teaching and learning component is vital to support the effective and efficient delivery of open and distance education within the blended approach adopted by many open universities.

In this study, the authors first examine the dimensions of quality assurance of key services that are closely associated with web-based education in the online LMS of Wawasan Open University (WOU). The authors then analyse the pattern of interactions in the LMS to determine the actual activities of learners in the web-based environment. By synthesising the findings, indicators that address diverse facets and components of quality relevant to web-based teaching and learning in the LMS are identified. The authors then discuss the application of the quality components within the overall QA framework in WOU to further enhance the quality of its web-based teaching and learning component. Assessment of learners' satisfaction in WOU is carried out to determine the effectiveness of the QA components in the LMS. The QA components identified in the web-based teaching and learning within the LMS are then recommended to Asian open universities for integration into their overall QA framework.

Keywords: quality assurance, e-learning, web-based teaching and learning, online learning management systems

Introduction

The dynamic business environment and powerful market forces in the 21st century are challenging leaders at open universities to compete successfully in the national and global higher education stage. Some educators (such as Nissenbaum & Walker, 1998; Trinkle, 1999) have concerns that open distance education may compromise the quality of education as delivered by conventional institutions. The notion of quality is becoming an important and overriding issue with the paradigm shift in the education landscape (Unesco, 2009) and the rapid penetration of Internet usage in education (Rovai & Downey, 2010).

Open universities are experiencing pressure from numerous stakeholders to become more client-focused, particularly in their provision of technology-enhanced education to systematically support the learning experience of open and distance learners. As open universities in Asia and around the world are actively developing and maintaining their respective institutional and national/regional-based quality assurance (QA) frameworks and practices, particular attention should be given to one of the key components within the overall QA framework; that is, the web-based teaching and learning in the online learning management system (LMS). The assurance of quality in the web-based teaching and learning component is vital to support the effective and efficient delivery of open distance education within the blended approach adopted by many open universities.

Extensive studies have been done on the overall management of quality assurance of higher education (such as Hoecht, 2006; Houston, 2008; Pillay & Kimber, 2009; Shah, Wilson & Nair, 2010; Kettunen, 2010; Latchem, 2011) and also in the context of open distance education and/or e-learning (such as Jung, 2005; Belawati & Zuhairi, 2007; Jung & Latchem, 2007; Jung 2009). However, specific studies on the development of quality assurance components that address learners' expectations and activities with regards to LMS in the context of Asian open universities are limited.

Delivering a high level of service quality to clients is important to service organisations, including higher education institutions (Brochado, 2009). Service quality has been identified as a robust predictor of student satisfaction (Stevenson & Sander, 1998; Helgesen & Nesset, 2007). Consistent with findings from previous research, recent literature (such as Lee, 2010; Udo, Bagchi & Kirs, 2011) indicate that service quality is a key factor of customer satisfaction in the educational and e-learning setting. Flexibility, responsiveness, interaction, student learning, technical support, and technology of online learning influence the satisfaction levels of students enrolled in Internet-based online classes (McGorry, 2003). Rovai (2003) suggested that the quality of technology, support services, and course design and instruction must be evaluated in order to monitor student satisfaction and performance in online education. In evaluating the service quality of e-learning, Zhang, Zhu, Hu and Li (2004) stated that organisations must ensure adequate understanding of the needs and expectations of customers, and should gather customer feedback and satisfaction with the services provided.

Hence, students' feedback within universities has increasingly become a vital concern in delivering quality education within the vigorous demand and supply setting of higher education institutions (Marcua, Zaharie & Osoian, 2009), including open universities. Student evaluation of teaching is a fundamental system for assuring teaching quality at higher education institutions (Bie & Meng, 2009). The identification of appropriate QA components for web-based delivery of education via the LMS demands consideration of the various facets of input to the QA system, particularly from the open distance learners in the context of open universities. Using the expectations of students to develop a quality assurance model (Stevenson, Muda, Karlsson, Szeky, Sander & Read, 2000) is one of the key ways of creating an effective system for ensuring the quality of the teaching and learning process.

Research framework and research methodology

In this study, the authors present an analysis of the identification, development and assessment of QA indicators and practices of web-based teaching and learning via the LMS in Wawasan Open University (WOU). This study focuses on the expectations and the actual activities in the LMS that are related to the satisfaction of the key stakeholder; that is, the open distance learner. This framework is in line with the ISO 9001 international standard for quality management systems, which promotes a process approach in conjunction with the Plan-Do-Control-Act quality improvement cycle introduced by Deming. In addition, related benchmark indicators of the Malaysian Qualifications Agency with regards to aspects of the delivery of quality education are also addressed.

The main objectives of the study are:

1. To examine the dimensions of the quality of key services that are closely associated with the LMS from the open distance learners' perspective.

2. To investigate the actual pattern of learners' activities and interactions in the LMS.

3. To identify the QA components of web-based teaching and learning in the LMS based on the findings.

4. To discuss the application of the QA components in the LMS of WOU (known as *WawasanLearn*) and the assessment of learners' satisfaction with the web-based teaching and learning platform.

5. To provide recommendations to open universities on the integration of QA components within web-based teaching and learning in their overall QA framework.

Figure 1 shows the conceptual framework of this case study.

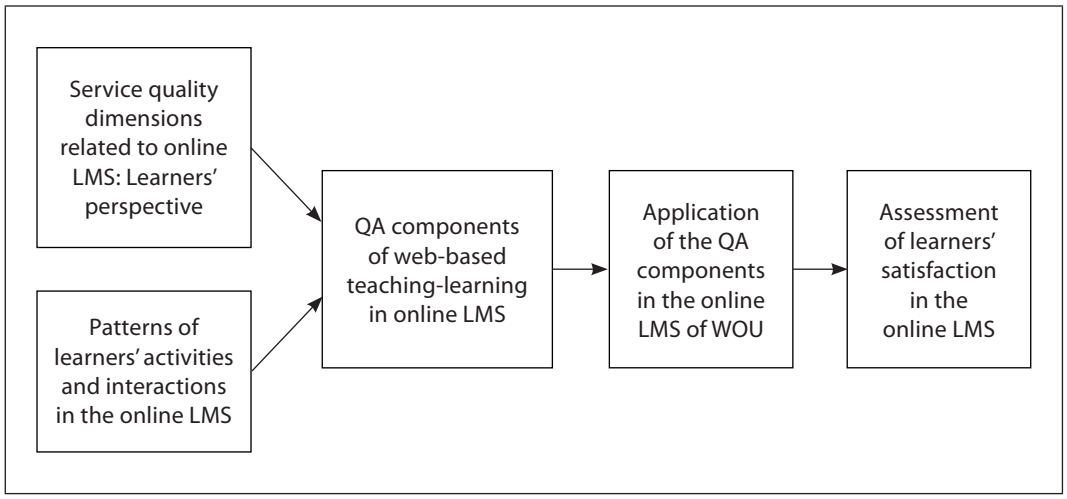

Figure 1 Conceptual framework of the case study

The authors carried out a survey and interviewed students to obtain the primary data, and performed content analysis of the activities in the LMS to analyse the secondary data. Specifically, the authors first examined the dimensions of the quality of key services that are closely associated with the LMS by administering a questionnaire to a sample of 408 active undergraduate learners from the inaugural January 2007 semester intake undertaking business programmes. The questionnaire was formulated based on the dimensions of service quality (SERVQUAL) measures; namely reliability, assurance, responsiveness, empathy and tangibility (Parasuraman, Zeithaml & Berry, 1988). In order to determine the service quality expected of the web-based teaching and learning in the LMS, the SERVQUAL instrument was customised by consolidating the 'expectation' section into ten items/statements with a 9-points Likert scale across the five dimensions of service quality. Learners were asked to rate whether the service quality provided was higher than (7 – 9), met with (4 – 6), or lower than (1 – 3) their expectations of each dimension. To assess the relative importance of the different service quality dimensions to learners, five statements were formulated, in which respondents were required to weigh the dimensions by allocating a total of 100 points among the five dimensions of service quality.

The authors also conducted an analysis (via a cross-sectional study) of the pattern of interactions in the LMS of selected courses offered by the School of Business and Administration at the end of the semester. Content analysis and quantitative analysis were conducted on indicators to measure the students' interaction with online content in terms of the pattern/activity level and frequency of assessing online learning resources, as well as the types of online learning resources preferred. Learners' interaction with the web-based resources and interaction in online forum discussions were investigated based on Moore (1989) and the dimensions of exchanges by Oliver and McLoughlin (1997), and Oliver, Omari and Herrington (1997).

Learner interaction in the online learning environment can be categorised into the social, procedural, expository and cognitive dimensions. Hillman et al. (1994) argued that intervening technologies enable learners to communicate with the content as well as interact with their teachers and other learners. Technologies that deliver instructions to distance learners are often classified as two-way interactive or one-way non-interactive (Bates, 1995).

Web-based resources in *WawasanLearn* were grouped into five categories to identify the preference of materials by learners:

WB1: Static pages (e.g., Welcome Letter, Course Overview Information and User's Guide)

WB2: Folders of course content (e.g., Attachment files including presentation files, reading materials, past year examination questions, etc.)

WB3: Hyperlinks to external websites (e.g., websites that are related to the course content)

WB4: Online discussion forums (asynchronous)

WB5: Online quizzes

By synthesising the findings, indicators that address diverse facets and components of quality relevant to web-based teaching and learning in the online LMS were identified. The authors then discussed the application of the quality components within the overall QA framework in WOU to further enhance the quality of its web-based teaching and learning component. Assessment of learners' satisfaction in WOU was done to determine the effectiveness of the QA components in the online LMS.

Background of Wawasan Open University

The vision of Wawasan Open University is to be a vibrant community that inspires lifelong learning, supports innovation and nurtures all-round personal growth. This vision is clearly reflected in its mission statement, which declares that the university is committed to the expansion of opportunities in higher education and to teaching excellence aimed at increasing the level of knowledge and scholarship among all Malaysians. Owned by the Wawasan Education Foundation, WOU offers accessible, flexible and affordable education to the adult community in support of lifelong learning. For WOU, quality underpins and undergirds everything it does. WOU benchmarks its academic programmes, courses, course materials and the entire learning process against international best practices in order to produce well-rounded, knowledgeable and competent professionals.

WOU opened its doors to students in January 2007 with 11 undergraduate programmes. The first postgraduate programme was offered in the January 2008 semester. The academic year in WOU consists of two semesters: January to June and July to December. Currently, there are 38 programmes offered by the four faculties, which are the School of Business and Administration, the School of Science and Technology, the School of Foundation and Liberal Studies, and the School of Education, Languages and Communications.

Since its establishment in 2006, the university has expanded in keeping with its goal of reaching working adults across the nation. There are now six regional offices — in Penang, Ipoh, Kuala Lumpur, Johor Baru, Kota Baru and Kuching — and three regional support office — in Petaling Jaya, Klang and Subang Jaya — that offer learning support and services to the students. Over 8,000 people in Malaysia, aged between 21 and 71 years, have experienced the learning opportunities at WOU with the majority of them falling within the 21–30 age group.

WOU education delivery model

Course materials

The comprehensive self-contained course materials (some of which include textbooks) that are provided by WOU either in print or CD form enables its students to engage in learning activities at any time and at any place to suit individual learning styles and needs These materials for self-learning are developed using a course development team (CDT) approach. The CDT comprises academic experts (local or international), instructional designers and language editors. The input from an external course assessor is part of the quality assurance process of WOU course development.

Learning support services

To assist students in their studies, WOU provides the following quality learning support services:

- Tutorials conducted by part-time tutors with relevant subject expertise and experience. Tutors are also available for consultation/counselling via the telephone at appointed times twice a week.

- *WawasanLearn* is a Moodle-based learning management system (LMS) that provides online learning support on a 24×7 basis. It enables students to access supplementary materials and links to relevant websites, and to participate in forum discussions with their course mates, tutors and course coordinators.

- Extensive electronic library resources that can be accessed at any time and from any place that has an Internet connection.

- Advisories on administrative matters from the regional offices, registry, as well as the call centre.

- Regional offices equipped with computer labs, libraries and free access computer terminals.

Assessment

The mastery of the learning outcomes of WOU courses is evaluated via an assessment strategy that consists of two components: continuous course assessment (e.g., tutor-marked assignments) and a final examination. To pass a WOU course, students are required to pass both components. An external examiner system is in place as part of the WOU QA process to ensure that examination papers and exit standards are in compliance with national and international norms.

Open entry system

WOU is one of six universities in Malaysia approved by the Ministry of Higher Education (MOHE) to admit students through the open entry system (OES). The OES enables mature students (≥21 years for undergraduates and ≥35 years for postgraduates) with minimal academic qualifications to be admitted provided they meet conditions stipulated by the MOHE. This makes WOU programmes more accessible compared to those of conventional universities.

4.5 Multiple exit points and flexible progression pathway

In support of the Government's efforts to promote the lifelong learning culture, WOU has introduced a series of awards at various levels as outlined in the Malaysian qualifications framework. These awards provide multiple exit points upon a ladder of academic attainment to enable Malaysian citizens to progressively enhance their level of personal and professional achievement. Students can determine their course load for each semester and the choice of their study programmes.

Quality assurance system in Wawasan Open University

WOU is committed to providing a rich learning experience to its students and to meeting the needs of industry. WOU firmly believes that this commitment must be underpinned by a sound quality assurance system that covers all aspects of the university's operations. The academic standards of WOU are benchmarked against international best practices.

Quality assurance management

Quality assurance at WOU is directed from its highest policy bodies such as the Board of Governors and the Senate and managed by the Deputy Vice Chancellor (Academic), who chairs the Quality Assurance Committee (QAC). The QAC is responsible for developing and implementing the university's QA systems and processes. A Quality Assurance Unit (QAU) headed by a manager coordinates and oversees the implementation of QA processes across the university, monitors compliance and recommends continuous improvement measures. The QAU also manages and maintains the quality management system documentation, namely, the quality policy, quality manual, document procedures and quality records. At the school/departmental level, a quality task force oversees the implementation and review of QA systems and processes. The quality task force works with the QAU and reports to the QAC to keep the university informed on all QA-related matters and continuous improvement plans. All committees operate under clearly defined standing orders with minutes recorded and archived.

Quality assurance policy

The Quality assurance policy that governs the WOU quality assurance system has the following objectives:

1. to establish the necessary quality assurance framework, procedures and performance indicators to achieve the vision and mission of the university;

2. to inculcate a culture of quality and ensure all members of the university community take responsibility for the quality and standard of their work performance;

3. to rigorously and continuously monitor to ensure that the policies are implemented effectively;

4. to develop and incorporate an effective feedback mechanism that enables the QAC to make informed decisions on any need to modify or improve the quality standards of the educational programmes in a timely manner.

Quality assurance procedures

WOU has developed an overarching policy document, entitled the Standard Operating Procedures (SOP) Framework that requires all schools/departments to document their respective processes and procedures based on a prescribed format. This ensures that essential information is consistently provided and disseminated to all relevant stakeholders.

The Quality Assurance Unit maintains a record of all the university SOPs, which is easily accessible and regularly updated. In building a shared responsibility for the quality assurance culture and achieving a greater level of transparency across various levels in WOU, the electronic versions of all SOPs are published in the staff online portal (intranet). All procedures and systems introduced to manage quality can only be improved through the active involvement of all the relevant stakeholders in the university.

Findings and discussion

Dimensions of quality assurance of key services associated with the online LMS

As indicated in **Table 1**, a total of 122 replies were obtained out of the 408 questionnaires that were distributed. The response rate was almost 30%. Of the 122 respondents, almost 60% were male. Most of the respondents were in the 21 – 30 age group, while nearly one-third were between 31 – 40 years old. The majority of the respondents (52%) have diploma qualifications and had undergone at least 11 years of formal primary and secondary education and two years of studies at college level. All respondents were working adults with most of them (63%) holding non-managerial level posts.

Demographics	Percentage (%)
Gender	
Male	58
Female	42
Age group	
21– 30	51
31– 40	33
41– 50	15
51 – 70	1
Academic qualifications	
PMR/SPM or equivalent of O-Level	47
Diploma or equivalent of GCE A-Level	52
Degree	1
Employment level	
Managerial	37
Non-managerial	63

Table 1 Demographics of the respondents (*n* = 122)

Key findings: Level of satisfaction by service dimensions

The level of satisfaction for all five service dimensions, as indicated by the mean scores of the 122 replies, ranged from 6.4–7.5 points on the 9-point scale as shown in **Table 2**. This result indicates that the service quality of online teaching and learning over the WOU LMS has met and slightly exceeded the desired service level of the respondents in their inaugural semester. As depicted in **Figure 2**, the level of satisfaction was the highest for the reliability service dimension, followed by the empathy, responsiveness, assurance and tangibles dimensions.

Statement no.	Statement	Dimension	Mean score	
1	The learning management system, *WawasanLearn*, is accessible at all times.	Reliability	6.9	7.5
2	The web-based resources for courses are available in *WawasanLearn* by the start of the semester.	Reliability	8.0	
3	*WawasanLearn* is helpful and informative enough to support your learning.	Assurance	6.6	6.9
4	The content of the web-based resources is appropriate and relevant to the course syllabus.	Assurance	7.2	
5	The tutors and course coordinators are prompt in replying to your questions posted in *WawasanLearn*.	Responsiveness	7.1	6.9
6	When you interact with the RO staff on administrative matters related to *WawasanLearn*, they are ready to assist.	Responsiveness	6.7	
7	When you interact with the RO staff regarding a specific administrative problem in *WawasanLearn*, they are courteous and willing to help.	Empathy	6.3	7.2
8	When you interact with the tutors and course coordinators regarding a specific academic issue in *WawasanLearn*, they are willing to guide and share.	Empathy	8.0	

9	The user interface of *WawasanLearn* is attractive and easy to navigate.	Tangible	6.2	6.4
10	The quality of the files and other web-based resources posted on *WawasanLearn* is good and they are accessible.	Tangible	6.5	

Table 2 Service quality level of satisfaction: Mean scores

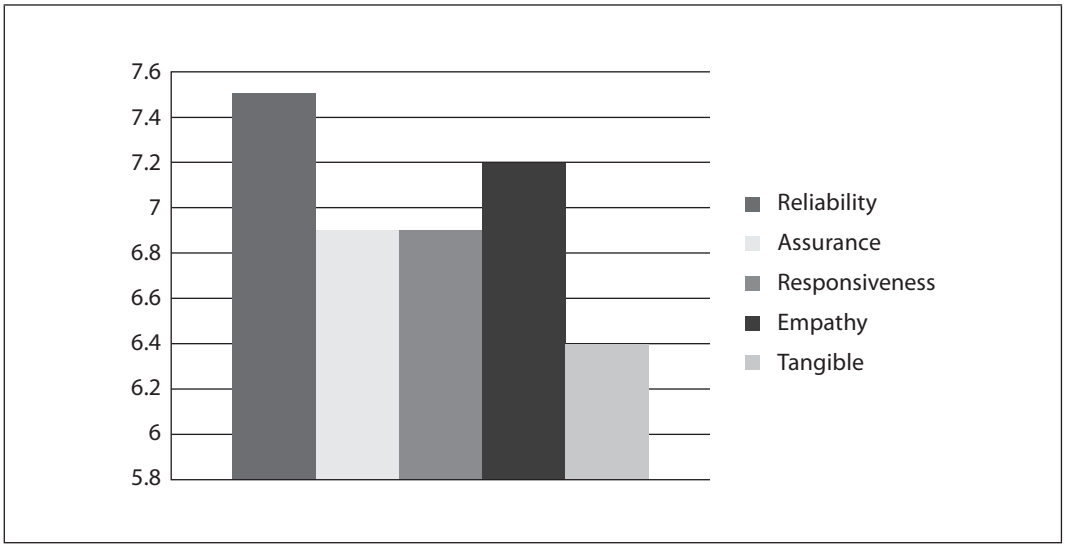

Figure 2 Mean service quality scores of the service dimensions in the online LMS

Although the mean scores of the level of satisfaction for all five dimensions seem encouraging, there were some areas of service in the online environment that needed improvement. The tangibles dimension clearly required improvement as did some sections of the other dimensions. Specifically, the user interface of *WawasanLearn* and the clarity/accessibility of the files required further improvement. As the target learners are working adults for whom time is a limiting factor, an interface which is easy to navigate for speedy retrieval of information is required. The academic staff (course coordinators and tutors) and the regional office staff need to be trained to provide better support on administrative and academic issues raised in *WawasanLearn*. The current level of competency has to be enhanced by providing training, particularly to academic staff in areas such as the development and management of course content, content enrichment and learner support in an ODL environment. In addition, the materials and information posted in the LMS should be relevant to the course content so that learners find them useful and informative. A proper monitoring system must be put in place to regularly monitor the quality, relevancy and currency of the materials posted.

Key findings: Relative importance of overall service quality dimensions

In terms of the relative importance of the service dimensions, the most important area, as highlighted by the respondents, was the assurance dimension (**Figure 3**). The other service dimensions in order of relative importance sequence were: reliability, tangibles, responsiveness and empathy.

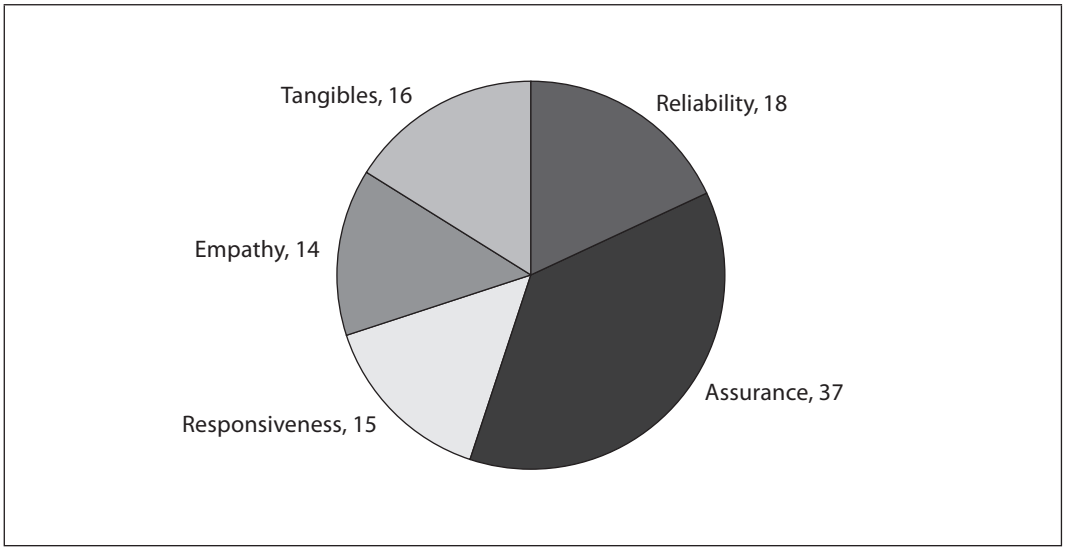

Figure 3 Relative importance of service quality dimensions in the LMS from the learners' perspective

Key findings: Level of satisfaction versus relative importance of the five service quality dimensions

The survey result showed that the assurance dimension is perceived by students to be the most important service quality area, but the level of satisfaction (as indicated by the mean score) for the dimension was ranked third (out of five), as shown in **Table 3**. The assurance dimension speaks about the competency, expertise and courtesy of service staff as well as their ability to deliver trust and confidence to the students. This dimension relates to the knowledge, skills and courtesy of the university's academic and administrative staff, which will instil confidence among the students and ensure the quality of online teaching and learning. When learners have acquired a fulfilling learning experience, they will subsequently share this with their peers, colleagues or family members, and thus they will be the most reliable marketing tools of the institution.

Dimension	Ranking as per level of satisfaction	Ranking as per relative importance
Assurance	3 (mean score = 6.9 / 9.0)	1 (average points allocated = 37)
Reliability	1 (mean score = 7.5 / 9.0)	2 (average points allocated = 18)
Tangibles	5 (mean score = 6.4 / 9.0)	3 (average points allocated = 16)
Responsiveness	3 (mean score = 6.9 / 9.0)	4 (average points allocated = 15)
Empathy	2 (mean score = 7.2 / 9.0)	5 (average points allocated = 14)

Table 3 Level of satisfaction versus relative importance of the five service quality dimensions

One of the key concerns in delivering quality web-based teaching and learning over the LMS involves understanding and managing learners' expectations effectively. As reflected in the above results, all identified dimensions of service quality should be addressed in formulating the QA components for the LMS. In the case of WOU, particular attention must be given to the dimensions of assurance, responsiveness and tangibles.

Pattern of activities and interactions in the Online LMS

An analysis of the actual pattern of activities and interactions in *WawasanLearn* of the inaugural batch of learners sampled in this case study was conducted in the last semester of their undergraduate studies. From the log files obtained, the activity level of the learners was the highest in month 2, followed by month 5 in a six-month semester in WOU. Similar patterns were observed for the other courses sampled. The average participation rate ([No. online/No. enrolled] × 100%) for the courses was around 89% and the average time spent online per student during the semester was 23.2 hours.

A further investigation was conducted on the most active course (highest in activity level divided by the number of students), which had 132 students. An analysis was done to determine the preferences of the learners based on their access to the various online resources posted in the course. As shown in **Figure 4**, learners accessed online forums the most and seemed to favour online quizzes (which did not contribute to the course assessment) as well. Access to downloadable course materials was average due to the nature of these resources, which are non-interactive. Access was lowest for static pages, followed by hyperlinks to external websites.

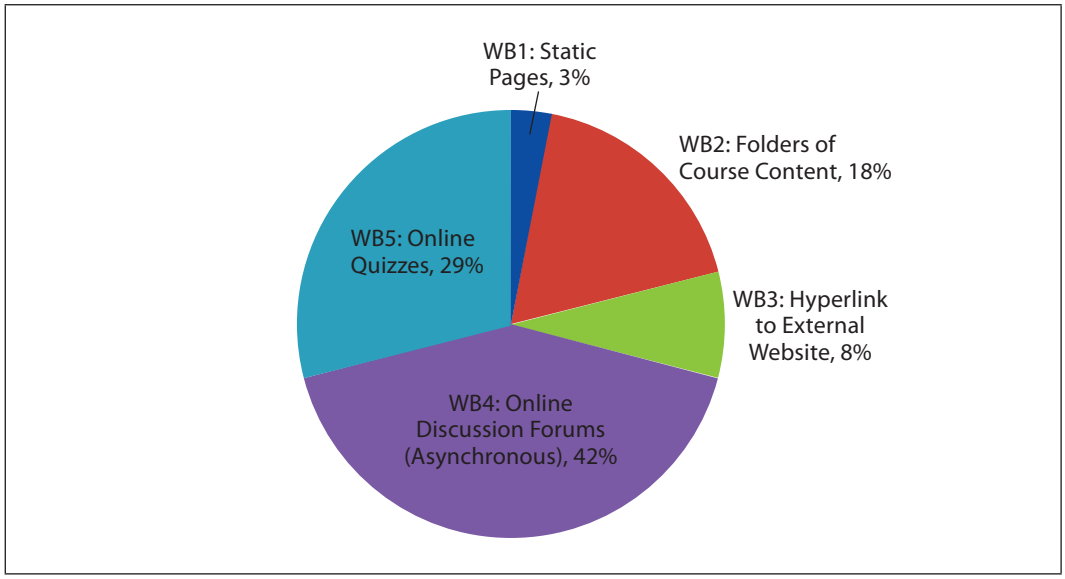

Figure 4 Distribution of learners' access to online resources

In further examining the online discussion forums, it was noted that the course had an average of five discussions per tutorial group forum, which were mostly initiated by the tutor. However, learners preferred to interact in the public forum (with a total of 138 discussion topics initiated) as they exchanged ideas and engaged in online discussions with their peers from all regional offices. The exchanges in the forums were also transcribed based on the social, procedural, expository and cognitive dimensions to better understand the activities and dimensions of interaction. The results are presented in **Figure 5**.

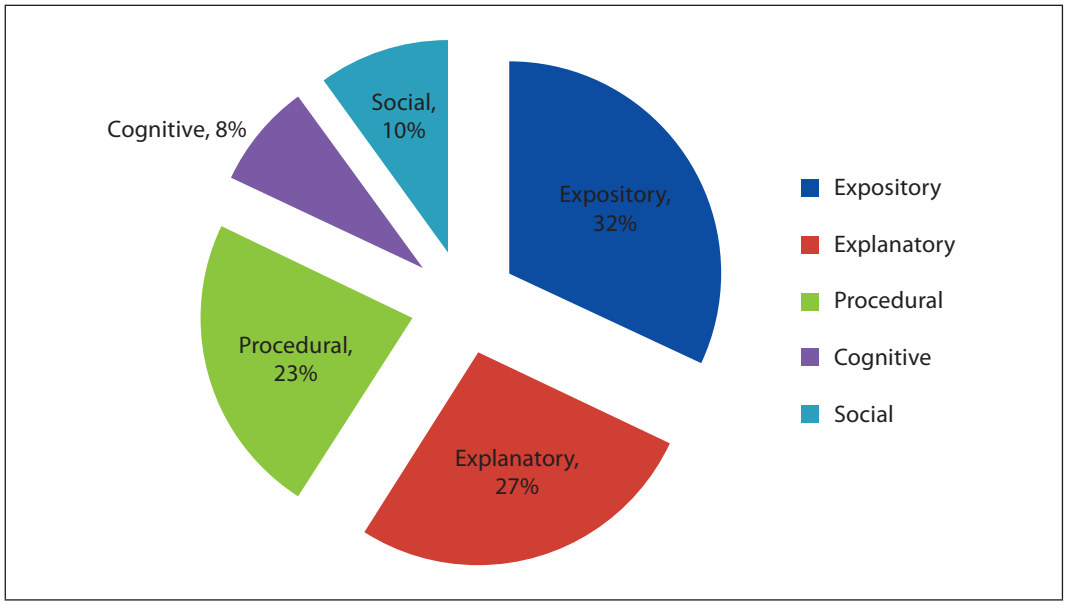

Figure 5 Dimensions of interactions in the online discussion forums

The expository dimension was the most dominant (32%), followed closely by exchanges in the explanatory dimension (27%) and procedural dimension (23%). The cognitive dimension was the least dominant for the learners (8%), while the social dimension accounted for 10% of the total interactions. The expository dimension involves demonstration of knowledge/ facts without much further elaboration, while the explanatory dimension refers to elaborate explanation of knowledge and content developed based on learners' responses. It was observed that learners utilised the online forums mostly to seek understanding of course concepts and knowledge of the subject matter. However, exchanges in the cognitive dimension, which involves providing constructive feedback and detailed commentary on course content using critical thinking that leads to knowledge development, were lacking. In addition, it was found that the most active thread in the public forum had 32 replies and the interval between responses was an average of five hours. As for the tutorial group forum, the interval between replies was observed to be 31 hours on average. This finding shows that the learners preferred to interact in the public forum rather than in the specific tutorial group gorum.

Summary of findings from interview sessions with learners

In addition to the survey and content analysis discussed above, interview sessions were also conducted with 15 representatives from the same group of learners to gather in-depth understanding of their expectations and concerns with regards to the WOU learning management system, *WawasanLearn*. Findings from the interview sessions were analysed along key themes associated with the quality concerns of the LMS, i.e., institutional, technological, faculty (course coordinators and tutors), instructional design and pedagogical factors.

The learners interviewed were generally satisfied with the technical aspects and the provision of online teaching and learning in *WawasanLearn*. They also highlighted that the main strength of *WawasanLearn* is its accessibility. This feature caters to the needs of working adults as their study or learning hours vary based on personal, job or family commitments. Besides that, bandwidth had been increased from two megabits per second (Mbps) in the January 2007 semester to six Mbps in the current semester.

However, several issues were brought up by the learners who were interviewed. The learners commented that the layout of the page, placement of the online materials and navigation within the discussion topics in the online forums needed to be refined. They suggested that the layout of the page be simplified and that the online resources should be placed in a more systematic and structured way so that information could be easily found. While the content published enabled information dissemination, learners also highlighted that some of the contents posted were not updated and might create ambiguity. In addition, there were also concerns relating to ethical issues; for example, in certain cases *WawasanLearn* was used as a platform for personal agenda.

Learners also indicated their concern over the responsiveness of some academic staff in addressing questions they had posted in the online forums. Some of the staff members and a number of learners were not active in the forums and this dampened the enthusiasm as well as motivation of the learners to participate in the online environment. Learners also suggested that academic staff post more interesting materials and initiate thought provoking discussions related to the assignments of the course to increase the participation rate of the learners. Some learners were of the opinion that some materials posted for certain courses were not directly related to the course content.

Along with the dimensions of service quality identified earlier, the actual activities of learners in the online learning environment as well as the qualitative feedback from learners discussed above were taken into account in developing the appropriate QA components for web-based teaching and learning in the context of WOU.

Application of quality assurance components in the LMS within the overall QA framework

In order to address the various facets of the QA components in web-based education that have been identified, WOU has developed QA measures for online teaching and learning activities as part of its overall QA framework. The development of these QA processes is in line with the institution's vision, mission and the key areas specified in its quality policy. The QA components for web-based teaching and learning in the LMS are documented in the standard operating procedures (SOP) for *WawasanLearn*. In addition to sections on administrative matters and processes related to *WawasanLearn*, the SOP details several key components of QA for teaching and learning in the web-based system, which are aimed at delivering quality service in the online environment to WOU's learners.

In the SOP, the purpose of *WawasanLearn* in supporting a collaborative learning community and offering multiple modes of learning — from self-paced coursework (e.g., web-based seminars and classes, downloadable audio and video materials) to group learning (online forums) — thus creating a comprehensive learning experience, is first explained.

In the aspect of governance in the LMS, the main stakeholders of *WawasanLearn* (i.e., administrators comprising educational technologists, IT support staff, course coordinators, tutors and students) and their responsibilities are clearly outlined. In addition, the rights and privileges of each stakeholder are stated. The workflow involved in granting access to *WawasanLearn* is depicted in flowcharts with quality objectives specified in the key processes. These flow charts illustrate the processes from the perspective of students, tutors, course coordinators as well as other users/staff.

Next, a detailed list of processes involved in the setting up of *WawasanLearn* for every new semester is presented. Several quality concerns, particularly of accuracy and timeliness, are addressed.

While the layout of *WawasanLearn* has been standardised across courses for a more structured view and easy navigation, specifications for materials and content in *WawasanLearn* have also been established. In particular, course coordinators are required to populate their respective course(s) every semester a week prior to the commencement of the semester with items such as course overviews, TMA questions, samples of marked TMAs, specimen exam papers and supplementary course materials.

A quality objective has been set for turnaround time in responding to a learner's question posted in the online forums. All queries posted in the online forums should get a response within 48 hours. In addition, a detailed guide on posting a web or text page, which provides advice on the clarity and appropriateness of online materials, is also provided to the academic staff.

Further, the rules and ethics of using *WawasanLearn* have also been developed for all users of the LMS platform.

Finally, the activities and specific roles of stakeholders involved in updating, upgrading and maintaining *Wawasanlearn* are explained as well.

Assessment of learners' satisfaction with the web-based teaching and learning in *WawasanLearn*

At the end of every semester in WOU, an assessment of student satisfaction is obtained using a feedback form and student dialogue sessions. Survey questionnaire forms, which solicit feedback and evaluation on the quality of all aspects of the delivery of open distance education and student support services, are given to students. These forms include a section to gauge the level of student satisfaction with the quality of the LMS. An investigation of the results obtained from the students' evaluation of the semesters in 2010 showed improvement in all items related to *WawasanLearn* in the questionnaire. A similar response was also obtained on the provision of learning support via the LMS during the dialogue sessions.

Conclusion

This study identified several important quality assurance issues of the key services closely associated with web-based teaching and learning in the LMS. In particular, learners' expectations and needs, along with their actual behaviour in the web-based environment, provided a holistic view in identifying quality components associated with the LMS. The lessons learnt from this case study suggest recommendations for open universities on the integration of QA components within web-based teaching and learning in their overall institutional QA framework.

To ensure that the quality of the student learning experience via the LMS is not compromised, quality assurance mechanisms and measures such as staff training and development in the pedagogical and technical aspects of online teaching and learning need to be implemented, in addition to the evaluation of student experience and learning outcomes.

Liew Teik Kooi is in the Quality Assurance Unit, Wawasan Open University, Penang, Malaysia. Email: andyliew@wou.edu.my

Teoh Ai Ping is in the Graduate School of Business, Universiti Sains Malaysia, Penang, Malaysia. Email: apteoh77@hotmail.com

References

Bates, A. W. (1995). *Technology, open learning and distance education*. New York: Routledge.

Bates, T. (2010). In search of quality in e-learning. Retrieved from http://www.tonybates.ca/2010/06/22/in-search-of-quality-in-e-learning on 1 August 2011.

Belawati, T. & Zuhairi, A. (2007). The practice of a quality assurance system in open and distance learning: A case study at Universitas Terbuka Indonesia (The Indonesia Open University). *International Review of Research in Open and Distance Learning*, *8*(1).

Bie, D. & Meng, F. (2009). On student evaluation of teaching and improvement of the teaching quality assurance system at higher education institutions. *Chinese Education and Society, 42*(2), 100–115.

Brochado, A. (2009). Comparing alternative instruments to measure service quality in higher education. *Quality Assurance in Education*, *17*(2), 174–190.

Fisher, R., Iredale, A., Ollin, R., & Robinson, D. (2010). Evaluation and quality assurance. *In Teaching in lifelong learning* (pp. 238–247). Milton Keynes: Open University Press.

Gunawardena, C. (1998). Employer expectations and quality assurance in Open University of Sri Lanka programmes. *Indian Journal of Open Learning*, *7*(3).

Helgesen, O. & Nesset, E. (2007). Images, satisfaction and antecedents: Drivers of student loyalty? A case study of a Norwegian university college. *Corporate Reputation Review*, *10*(1), 38–59.

Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education*, *8*(2), 30–42.

Hoecht, A. (2006). Quality assurance in UK higher education: Issues of trust, control, professional autonomy and accountability. *Higher Education*, *51*(4), 541 –563.

Houston, D. (2008). Rethinking quality and improvement in higher education. *Quality Assurance in Education*, *16*(1), 61 –79.

Houston, D. (2010). Achievements and consequences of two decades of quality assurance in higher education: A personal view from the edge. *Quality in Higher Education*, *16*(2), 177 –180.

Javed, M. & Ahmad, M. (2010). Enhancing quality of education through e-learning: The case study of Allama Iqbal Open University. *Turkish Online Journal of Distance Education*, *11*(1). Retrieved from http://tojde.anadolu.edu.tr/tojde37/articles/article_5.htm on 1 July 2011.

Jung, I. S. (2005). Quality assurance survey of mega-universities and selected distance teaching institutions. In C. McIntosh & Z. Voroglu (Eds.), *Lifelong learning and distance higher education* (pp. 79 –96). London and New York: Routledge.

Jung, I. S. (2009). The emergence of for-profit e-learning providers in Asia. *ICT International*, *53*(2), 18 –21.

Jung, I. S. & Latchem, C. (2007). Assuring quality in Asian open and distance learning. *Open Learning*, *22*(3), 235 –250.

Kandil, M. S., Hassan, A. E., Asem, A. S., & Ibrahim, M. E. (2011). Prototype of Web2-based system for quality assurance evaluation process in higher education institutions. *International Journal of Electrical and Computer Sciences*, *10*(2).

Kettunen, J. (2010). Cross-evaluation of degree programmes in higher education. *Quality Assurance in Education*, *18*(1), 34 –46.

Latchem, C. (2011). Quality matters for Turkish higher education. *Anadolu Journal of Educational Sciences International*, *1*(1), 1 –18.

Lee, J. W. (2010). Online support service quality, online learning acceptance and student satisfaction. *The Internet and Higher Education*, *13*(4), 277 –283.

Marcus, A., Zaharie, M., & Osoian, C. (2009). Student satisfaction as a quality management technique in higher education. *International Association of Computer Science and Information Technology — Spring Conference 2009* (pp. 388 –391).

McGorry, S. Y. (2003). Measuring quality in online programs. *The Internet and Higher Education*, *6*(2), 159 –177.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education*, *3*(2), 1 –7.

Nissenbaum, H. & Walker, D. (1998). A grounded approach to social and ethical concerns about technology and education. *Journal of Educational Computing Research*, *19*(4), 411 –432.

Oliver, R. & McLoughlin, C. (1997). Interactions in audio-graphics and learning environments. *American Journal of Distance Education*, *11*(1), 34 –54.

Oliver, R., Omari, A., & Herrington, J. (1997). Exploring student interaction in collaborative World-wide Web learning environments. *ED-Media/Edtelecom 1997* (Vol. II, pp. 812 –817). Retrieved http://ecu.edu.au/oliver/docs/97/EM1doc.pdf on 1 July 1 2008.

Parasuraman, A, Berry, L., & Zeithaml, V. (1988). SERVQUAL: A multiple-item scale for measuring service quality. *Journal of Retailing*, *64*(1), 12 –40.

Pillay, H. & Kimber, M. (2009). Quality assurance in higher education: For whom and of what? *Journal of Management Education*, *3*(3), 270 –281.

Rovai, A. P. (2003). A practical framework for evaluating online distance education programs. *The Internet and Higher Education*, *6*(2), 109 –124.

Rovai, A. P. & Downey, J. R. (2010). Why some distance education programs fail while others succeed in a global environment. *The Internet and Higher Education*, *13*(3), 141 –147.

Shah, M., Wilson, M., & Nair, C. S. (2010). The Australian higher education quality assurance framework: Its success, deficiencies and way forward. *Australasian Association for Institutional Research Forum*. Retrieved from http://www.aair.org.au/app/webroot/media/pdf/AAIR%20Fora/Forum%202010/HEQualityFrameworkMahsoodShah.pdf on 1 July 2011.

Stevenson, K., Muda, U., Karlsson, C., Szeky, A., Sander, P., & Read, T. (2000). Developing an ODL quality assurance model using students' expectations of tutor support needs. *European Journal of Open, Distance and E-learning*. Retrieved from http://www.eurodl.org/index.php?p=archives&year=2000&article=85 on 1 July 2011.

Stevenson, K. & Sander, P. (1998). Improving service quality in distance education. *European Journal of Open, Distance and E-learning*. Retrieved from http://www.eurodl.org/?p=archives&year=1998&article=22 1 July 2011.

Trinkle, D. A. (1999). Distance education: A means to an end, no more, no less. *The Chronicle of Higher Education*, *45*(48).

Udo, G. J., Bagchi, K. K., & Kirs, P. J. (2011). Using SERVQUAL to assess the quality of e-learning experience. *Computers in Human Behaviour*, *27*(3), 1272 –1283.

UNESCO (2009). Quality assurance in higher Education. Paris: UNESCO/International Institute for Educational Planning. Retrieved from http://www.iiep.unesco.org/focus-on-higher-education/quality-assurance-in-higher-education.html on 1 July 2011.

Zhang, Y., Zhu, Z., Hu, X., & Li, Q. (2004). Specification for service quality management system of e-learning. *Lecture notes in Computer Science*, 3143, 163 – 188.