
Pergamon

THE INTERNET AND HIGHER EDUCATION

Internet and Higher Education 6 (2003) 159–177

Measuring quality in online programs

Susan Y. McGorry*

Department for Business, De Sales University, 2755 Station Avenue, Center Valley, PA 18034, USA

Received 27 December 2002; received in revised form 18 February 2003; accepted 21 February 2003

Abstract

This study investigates the distance education and information technology literature in an attempt to develop a model to measure quality and learning in online courses. The resulting model is the first proposed to address issues of flexibility, responsiveness, interaction, student learning, technical support, technology, and student satisfaction simultaneously. The reliability and validity of the model are explored with suggestions for future research. As Internet-based education continues to grow worldwide, this model may assist policymakers, faculty, students, and others in making reasonable and informed judgments with regard to the quality of and learning in Internet-based distance education.

Keywords: Online programs; Quality; Distance education; Information technology; Model

1. Introduction

The first distance learning program in the United States began in the 1800s when the postal system delivered teaching texts and lessons to rural learners to acquire skills not taught in public institutions at that time. Thus, although distance learning is neither a recent nor a new phenomenon, the development and adoption of sophisticated communication technologies often creates that impression. Emphasis on communication tools may lead to a focus on technology versus teaching effectiveness and student learning (Sherry, 1995). When programs appropriately adopt and adapt technology to deliver distance education courses, the technology essentially should be transparent to facilitate learning.

* Tel.: +1-610-282-1100x1329; fax: +1-610-282-2254.
E-mail address: sue.mcgorry@desales.edu (S.Y. McGorry).

1096-7516/03/$ – see front matter
doi:10.1016/S1096-7516(03)00022-8

Whereas distance education has traditionally been conducted by such means as correspondence or video transmission, it is now increasingly conducted via the Internet (Gibson & Gibson, 1995). Internet-based courses are classes that are delivered primarily or exclusively via the use of e-mail and Web pages. Internet-based courses are simply one pedagogical approach within the field of distance education; however, delivery of distance education via the Internet is accelerating rapidly.

In 2000, Sistek-Chandler reported that U.S. universities offered over 54,000 courses online with an enrollment of over 1.6 million students. Additionally, that online education is expected to grow from a $350-million to a $2-billion industry by the year 2003 (McGinn, 2000). These statistics suggest that online learning may play a significant role in education in the future, and may certainly be the impetus for institutional immersion in the online education market.

Many of these same institutions, however, have not considered the issue of program evaluation. Although the number of courses being delivered via the Internet is increasing rapidly, our knowledge of what makes these courses effective learning experiences is limited. To facilitate successful learning experiences, institutions must develop distance education policies that will maintain course integrity and quality and foster innovation in the "virtual classroom" to enhance student learning. With the rapid growth worldwide of teaching and learning on the Internet, more attention must be dedicated to the nature and quality of online higher education.

There are few studies that empirically address the issue of quality in online programs (Fresen, 2002; Sonwalkar, 2002). Additional theory-driven empirical research is necessary so that criteria for developing effective Internet-based programs are established. Initial efforts to examine this question have focused on comparing student performance in online and traditional classroom settings, or student satisfaction (Arbaugh, 2000b; Hiltz & Wellman, 1997). The goal of measuring quality has been quite elusive in past research, as there are many other intangible dimensions of "quality" that make the measurement of the concept quite challenging (Gronroos, 1978; Parasuraman, Berry, & Zeithaml, 1985, 1988, 1994). This study will attempt to review the current literature on evaluating the effectiveness of Internet-based education and investigate constructs that may become the basis for a model evaluating quality in an online program.

2. Review of the literature: online course evaluation

Much research on the evaluation of Internet-based teaching focuses on the differences between distance and traditional classroom teaching. Russel (1997) cites over 300 studies dated from 1928 demonstrating no significant difference between distance and traditional learning. Russel's study, however, includes various modes of distance education such as mail, radio, one-way television, and videotape. Additionally, the methodologies employed in many of the studies are questionable. Russel's conclusions suggest that perhaps it is time to move beyond the issue of simply comparing distance courses to traditional classes and to strive to understand whether quality learning is occurring in Internet-based courses. Currently, research regarding the effectiveness of online learning is still significantly limited (Arbaugh, 2002).

Computer-based learning studies have attempted to address the issue of quality in online learning. One of the largest studies dedicated to this topic was Quality On the Line: Benchmarks for Success in Internet-Based Distance Education, commissioned by the National Education Association, the nation's largest professional association of higher education faculty, and Blackboard, a leading Internet education company (Phipps & Merisotis, 1999). This study examined case studies of six colleges and universities that provide Internet-based degree programs. Additionally, a thorough review of current literature on distance education was conducted to identify benchmarks used by other organizations to measure quality and learning. The case studies were designed to ascertain the degree to which various measures of quality identified in previous studies are actually being incorporated into the policies, procedures, and practices of institutions that are distance education leaders. The outcome was 24 benchmarks addressing the role of the institution, administration, faculty, and students that are essential to ensure quality in Internet-based distance education.

Two leaders in distance education, the American Distance Education Consortium (1999) and Pennsylvania State University (in its Innovations in Distance Education Project), also developed guidelines for distance teaching and learning, based on the premise that the principles that create quality face-to-face instruction are often similar to those in Web-based environments. Their guidelines address issues of learning objectives and outcomes, learner engagement, and problem- and knowledge-based learning. There is additional research indicating that online program quality must be addressed in course planning and the development of instructional design (Graham & Scarborough, 2001; Harasim, Hiltz, Teles, & Turoff, 1995; Li, 2002). Much of this research also emphasizes the fact that continual assessment of the program is necessary to identify successes and problems whereas summative assessment must be targeted to external parties.

Student satisfaction and learning has also been a focus in online learning. Arbaugh (2000a, 2000b, 2000c) examined the research literatures of technology adoption, computer-mediated communication, and general distance education, identifying five general factors that may influence student learning in and satisfaction with Internet-based courses: perceived usefulness of the course, flexibility, interaction, student experience, and engagement.

Finally, the University of Illinois (Chicago, Springfield, and Urbana-Champaign campuses) conducted a yearlong faculty seminar to address faculty concerns about the implementation of technology for teaching (1999). The seminar concluded that online teaching and learning can be achieved with high quality if new approaches are employed that compensate for the limitations of technology and if professors strive to create the "human, personal touch" for students. Issues considered were innovation in teaching, student engagement, interaction, and technical support.

3. A model for evaluating effectiveness of internet delivered courses

The majority of the distance education research before 1990 was dedicated to understanding the differences between traditional and distance education courses. Research in the last decade, however, has begun to focus on specific distance pedagogical tools and how they may effect

learning and quality. Eliminating overlap and redundancy, the previously mentioned studies seem to suggest the following seven constructs would be necessary to evaluate quality and learning in online courses: flexibility, responsiveness and student support, student learning, interaction, technology and technical support, and student satisfaction.

3.1. Flexibility

In research to date on Internet-based courses, students most often indicate that their preference for online courses is strongly correlated with course flexibility (Harasim, 1990). The time and place independence available via Internet technology enables students to have a high degree of flexibility in when and where they participate in Internet-based courses. The typical consumers of continuing education have had to manage increasing activity among their jobs, family, and work-related travel throughout the 1990s (Clarke, 1999; Greco, 1999), which makes the flexibility particularly attractive for this population.

Because valid and reliable instruments to assess student attitudes on flexibility are somewhat limited, the measures for these items were developed by adapting theoretical perspectives on these dimensions in videoconferencing formats (Thach & Murphy, 1995) to the Internet-based environment. Perceived flexibility may be measured with the following items [Unless otherwise mentioned, each of the items under each construct would be measured using a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*)]:

1. Taking this class via the Internet allowed me to arrange my work for the class more effectively.
2. The advantages of taking this class via the Internet outweighed any disadvantages.
3. Taking this class via the Internet allowed me to spend more time on non-work-related activities.
4. There were no serious disadvantages to taking this class via the Internet.
5. Taking this class via the Internet allowed me to arrange my work schedule more effectively.
6. Taking this class via the Internet saved me time commuting to class.
7. Taking this class via the Internet allowed me to take a class I would have otherwise missed.
8. Taking this class via the Internet should enable me to finish my degree earlier.

3.2. Responsiveness and student support

Similar to technical support, students in Internet-based courses must be provided with access to institutional resources that will facilitate their completion of an online program. This includes not only continual access to "live human beings" but also electronic resources that keep the student connected to the program. The following items addressing students' support and responsiveness are adapted from the results of the Quality On the Line study by Phipps and Merisotis (1999).

1. Students are advised about the program to determine if they possess the self-motivation and commitment to learn at a distance.

2. Students are advised about the program to determine if they have access to the minimal technology required by the course design.
3. Students have access to sufficient library resources that may include a "virtual library" accessible through the World Wide Web.
4. Questions directed to student service personnel are answered accurately and quickly, with a structured system in place to address student complaints.
5. Students receive information about programs, including admission requirements, tuition and fees, books and supplies, technical requirements, and student support services.

3.3. Self-reported (perceived) learning

In order for student learning to occur, the learning experience must have objectives and outcomes and the learner must be actively engaged. Student learning can be measured using an adaptation of Alavi's six-item scale. This scale has been a highly reliable measure of student learning in previous studies of distance education courses (Alavi, 1994; Alavi, Yoo, & Vogel, 1997; Arbaugh, 2000a). Additionally, several items from the University of Illinois (1999) study are employed:

1. Students are learning factual material.
2. Students are gaining a good understanding of basic concepts.
3. Students are learning to identify central issues.
4. Students are learning to interrelate important issues.
5. Students are developing the ability to communicate clearly about the subject.
6. Students are developing the ability to integrate facts and develop generalizations.
7. Clearly outlined objectives and outcomes are provided.
8. Students are actively engaged in the learning process.
9. Students are provided with course information that outlines course objectives, concepts, and ideas.
10. Learning outcomes are clearly summarized.

3.4. Interaction—participation in learning

Learning experiences should support interaction between professors and their students and between students themselves. As mentioned earlier, other researchers have found that students often associate an interactive learning environment with an effective learning environment. Many instructors find creating interactivity in an online course one of the greatest challenges in Internet-based education. However, this may be the key to obtaining long-term subscription to this type of learning. Arbaugh (2000a) found the following items highly reliable in measuring interactivity in Internet-based classes:

1. Student to student interaction was more difficult than in other courses (reverse coded).
2. Class discussions were more difficult to participate in than in other courses (reverse coded).
3. I learned more from my fellow students in this course than in any other course.

4. The instructor frequently attempted to elicit student interaction.
5. Interacting with other students and with the instructor became more natural as the course progressed.
6. I felt that the quality of class discussions was high throughout the course.
7. It was easy to follow class discussions.
8. Classroom dynamics were not much different than in other courses.
9. Once we became familiar with the technology (i.e., Blackboard) it had very little impact on the class.
10. Student to instructor interaction was more difficult than in other courses (reverse coded).
11. Student interaction with faculty and other students is frequent.
12. Student interaction with faculty and other students is facilitated through a variety of ways, including voice mail and e-mail.
13. Feedback on student assignments and questions is constructive.
14. Feedback on student assignments and questions is provided in a timely manner.

3.5. Perceived usefulness and ease of use of technology

In the technology acceptance model (TAM), beliefs that a technology is useful and easy to use influence the users' attitudes toward the technology and thereby their decision to adopt the technology. This model is grounded in the information technology literature and has been found to be a valid predictor of the use of computer software (Bagozzi, Davis, & Warshaw, 1992) and the World Wide Web (Atkinson & Kydd, 1997). In the context of Internet-based courses, this suggests that perceived usefulness and the ease of use of the delivery medium may affect students' attitudes toward their course experience and, consequently, affect their decision to take other Internet-based courses in the future. There are eight proposed items to measure perceived usefulness and perceived ease of use of a technology (each of the two variables in the TAM); these have been used extensively in prior studies (Atkinson & Kydd, 1997; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989).

1. Using the technology (i.e., Blackboard) would enhance my effectiveness in the program.
2. Using the technology (i.e., Blackboard) would improve my performance in the program.
3. I would find the technology useful in my program.
4. Using the technology in the program would enhance my productivity.
5. It was easy for me to become skillful at using the technology.
6. Learning to operate the technology was easy for me.
7. I found it easy to get the technology to do what I need it to do for me.
8. I found the technology easy to use.

3.6. Technical support

The items suggested to measure technical support were adopted from both the Phipps and Merisotis (1999) and the University of Illinois (1999) studies. Technical support is crucial in an online learning environment. If students are unable to access course material, their

participation will be seriously hampered. Unfortunately, initial frustration with technical problems in online courses can cause students to quickly abandon the program, creating long-term negative perceptions of these courses and preventing students from pursuing this type of education.

1. Students are provided with hands-on training and information to aid them in securing material through electronic databases, interlibrary loans, government archives, news services, and other sources.
2. Throughout the duration of the course/program, students have convenient access to technical assistance.
3. Throughout the duration of the course/program, students have convenient access to the technical support staff.

3.7. Student satisfaction

Satisfaction with course activities often has been included as a dependent variable in studies of distance education and Internet-based courses (Alavi, Wheeler, & Valacich, 1995; Alavi et al., 1997; Warkentin, Sayeed, & Hightower, 1997). Given the newness of the use of the educational medium, student satisfaction with Internet-based courses is likely to determine whether the student takes subsequent courses in this format or with the same education provider. The following items are adopted from the abovementioned studies:

1. I am satisfied with my decision to take this course via the Internet.
2. If I had another opportunity to take a course via the Internet I would gladly do so.
3. My choice to take this course via the Internet was a wise one.
4. I was very satisfied with this course.
5. I feel that this course served my needs well.
6. Conducting the course via the Internet improved the quality of the course compared to other courses.
7. I will take as many courses via the Internet as I can.
8. The quality of the course compared favorably to my other courses.
9. I feel the quality of the course I took was largely unaffected by conducting it via the Internet.
10. I was disappointed by the way this course worked out (reverse coded).
11. If I had to do it over, I would not take this course via the Internet (reverse coded).
12. Conducting this course via the Internet made it more difficult than other courses I have taken (reverse coded).

Thus, a 60-item scale is proposed to measure seven constructs (flexibility, responsiveness and student support, student learning, interaction, technology, technical support, and student satisfaction) indicative of quality and learning effectiveness in online programs and courses. Length of this instrument may change after pilot testing and item analysis.

4. Methodology

4.1. Participants

Participants in this pilot study are students in a quarterly part-time MBA program with three campus locations. The MBA program offers approximately 90% of its curriculum online. The total number of students in the program is 750. The mean age of the students is 37, with 45% male and 55% female gender distribution. One instructor delivered the website survey to students at the end of four online courses over four semesters. Participation was voluntary.

4.2. Research objectives

The purpose of the current study was to explore the following research objectives:

- Develop a model to evaluate quality in online learning programs.
- Test the reliability and validity of the model.
- Provide recommendations for future research regarding quality in online learning programs.

No specific hypotheses are suggested, as the research is essentially exploratory to provide direction for further investigation in the future. Survey research methodology is employed in this study, with a reliability and factor analysis to summarize data and analyze reliability and validity. SPSS was used for all statistical analysis.

4.3. Questionnaire

The questionnaire is detailed in the first section of this paper. The 60 Likert scaled questions focus on issues of flexibility, responsiveness and student support, student learning, interaction, technology, technical support, and student satisfaction. All items were structured and closed-ended, represented by a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Six variables are recoded due to the wording of the questions. They are:

24. Student to student interaction was more difficult than in other courses. (reverse coded).
25. Class discussions were more difficult to participate in than in other courses. (reverse coded).
33. Student to instructor interaction was more difficult than in other courses (reverse coded).
58. I was disappointed by the way this course worked out (reverse coded).
59. If I had to do it over, I would not take this course via the Internet (reverse coded).
60. Conducting this course via the Internet made it more difficult than other MBA courses I have taken (reverse coded).

Table 1
Item means

Item	Mean
1. Taking this class via the Internet allowed me to arrange my work for the class more effectively.	1.34
2. The advantages of taking this class via the Internet outweighed any disadvantages.	1.35
3. Taking this class via the Internet allowed me to spend more time on non-work-related activities.	1.66
4. There were no serious disadvantages to taking this class via the Internet.	2.03
5. Taking this class via the Internet allowed me to arrange my work schedule more effectively.	1.46
6. Taking this class via the Internet saved me time commuting to class.	1.20
7. Taking this class via the Internet allowed me to take a class I would have otherwise missed.	2.17
8. Taking this class via the Internet should enable me to finish my degree earlier.	2.24
9. Students are advised . . . to determine . . . self-motivation and commitment to learn at a distance.	2.78
10. Students are advised . . . to determine . . . access to minimal technology required by the course.	2.54
11. Students have access to sufficient library resources accessible through the World Wide Web.	1.51
12. Questions directed to student service personnel answered accurately, quickly.	1.93
13. Students receive information about programs, admission requirements, technical requirements, etc.	1.66
14. Students are learning factual material.	1.29
15. Students are gaining a good understanding of basic concepts.	1.41
16. Students are learning to identify central issues.	1.37
17. Students are learning to interrelate important issues.	1.51
18. Students are developing the ability to communicate clearly about the subject.	1.51
19. Students are developing the ability to integrate facts and develop generalizations.	1.51
20. Clearly outlined objectives and outcomes are provided.	1.27
21. Students are actively engaged in the learning process.	1.44
22. Students are provided with course information that outlines course objectives, concepts, and ideas.	1.17
23. Learning outcomes for each course are clearly summarized.	1.46
24. Student to student interaction was more difficult than in other courses. (reverse coded)	3.78
25. Class discussions were more difficult to participate in than in other courses. (reverse coded)	2.28

(continued on next page)

Table 1 (*continued*)

Item	Mean
26. I learned more from my fellow students in this course than in any other course.	3.05
27. The instructor frequently attempted to elicit student interaction.	1.30
28. Interacting with other students and with the instructor became more natural as the course progressed.	1.76
29. I felt that the quality of class discussions was high throughout the course.	1.88
30. It was easy to follow class discussions.	1.68
31. Classroom dynamics were not much different than in other courses.	2.90
32. Once we became familiar with the technology (i.e., Blackboard) it had very little impact on the class.	1.80
33. Student to instructor interaction was more difficult than in other courses.	3.85
34. Student interaction with faculty and other students is frequent.	2.29
35. Student interaction with faculty and other students is facilitated through a variety of ways.	1.49
36. Feedback on student assignments and questions is constructive.	1.59
37. Feedback on student assignments and questions is provided in a timely manner.	1.51
38. Using the technology (i.e., Blackboard) would enhance my effectiveness in the program.	1.66
39. Using the technology (i.e., Blackboard) would improve my performance in the program.	1.68
40. I would find the technology useful in my program.	1.59
41. Using the technology in the program would enhance my productivity.	1.54
42. It would be easy for me to become skillful at using the technology.	1.43
43. Learning to operate the technology is easy for me.	1.24
44. I find it easy to get the technology to do what I need it to do for me.	1.40
45. I find the technology easy to use.	1.32
46. Students are provided with hands-on training and information to aid them in securing resources.	1.90
47. Throughout the duration of the course/program, students have convenient access to technical assistance.	1.71
48. Throughout the duration of the course/program, students have convenient access to the technical support staff.	1.76
49. I am satisfied with my decision to take this course via the Internet.	1.33
50. If I had another opportunity to take a course via the Internet I would gladly do so.	1.27
51. My choice to take this course via the Internet was a wise one.	1.34
52. I was very satisfied with this course.	1.53

Table 1 (*continued*)

Item	Mean
53. I feel that this course served my needs well.	1.54
54. Conducting the course via the Internet improved the quality of the course compared to other courses.	2.24
55. I will take as many courses via the Internet as I can.	1.41
56. The quality of the course compared favorably to my other courses.	1.90
57. I feel the quality of the course I took was largely unaffected by conducting it via the Internet.	2.15
58. I was disappointed by the way this course worked out. (reverse coded)	1.49
59. If I had to do it over, I would not take this course via the Internet. (reverse coded)	1.80
60. Conducting this course via the Internet made it more difficult than other courses I have taken. (reverse coded)	1.44

Table 2
Recommended deleted items, item-to-total correlations

Item	Item-to-total correlation
6. Taking this class via the Internet saved me time commuting to class.	− .0125
7. Taking this class via the Internet allowed me to take a class I would have otherwise missed.	.2810
9. Students are advised … to determine … self-motivation and commitment to learn at a distance.	.1690
10. Students are advised … to determine … access to minimal technology required by the course.	.1611
13. Students receive information about programs, admission requirements, technical requirements, etc.	.3405
22. Students are provided with course information that outlines course objectives, concepts, and ideas.	.2707
42. It would be easy for me to become skillful at using the technology.	− .0277
43. Learning to operate the technology is easy for me.	.1451
44. I find it easy to get the technology to do what I need it to do for me.	.3518
45. I find the technology easy to use.	.3936
46. Students are provided with hands-on training and information to aid them in securing resources.	.3953
48. Throughout the duration of the course/program, students have convenient access to the technical support staff.	.2468

Table 3
Resulting item-to-total correlations

Item	Correlation
1. Taking this class via the Internet allowed me to arrange my work for the class more effectively.	.6273
2. The advantages of taking this class via the Internet outweighed any disadvantages.	.8174
3. Taking this class via the Internet allowed me to spend more time on non-work-related activities.	.5026
4. There were no serious disadvantages to taking this class via the Internet.	.5597
5. Taking this class via the Internet allowed me to arrange my work schedule more effectively.	.5314
8. Taking this class via the Internet should enable me to finish my degree earlier.	.3598
11. Students have access to sufficient library resources accessible through the World Wide Web.	.3821
12. Questions directed to student service personnel answered accurately, quickly.	.4369
14. Students are learning factual material.	.4760
15. Students are gaining a good understanding of basic concepts.	.6810
16. Students are learning to identify central issues.	.8765
17. Students are learning to interrelate important issues.	.7014
18. Students are developing the ability to communicate clearly about the subject.	.8923
19. Students are developing the ability to integrate facts and develop generalizations.	.6866
20. Clearly outlined objectives and outcomes are provided.	.6604
21. Students are actively engaged in the learning process.	.5481
23. Learning outcomes for each course are clearly summarized.	.8181
24. Student to student interaction was more difficult than in other courses. (reverse coded)	− .4628
25. Class discussions were more difficult to participate in than in other courses. (reverse coded)	.5770
26. I learned more from my fellow students in this course than in any other course.	.5460
27. The instructor frequently attempted to elicit student interaction.	.6533
28. Interacting with other students and with the instructor became more natural as the course progressed.	.8619
29. I felt that the quality of class discussions was high throughout the course.	.8655
30. It was easy to follow class discussions.	.4810
31. Classroom dynamics were not much different than in other courses.	.4175
32. Once we became familiar with the technology (i.e., Blackboard) it had very little impact on the class.	.3834
33. Student to instructor interaction was more difficult than in other courses.	− .5077

Table 3 (*continued*)

Item	Correlation
34. Student interaction with faculty and other students is frequent.	.5005
35. Student interaction with faculty and other students is facilitated through a variety of ways.	.4256
36. Feedback on student assignments and questions is constructive.	.6157
37. Feedback on student assignments and questions is provided in a timely manner.	.6211
38. Using the technology (i.e., Blackboard) would enhance my effectiveness in the program.	.7998
39. Using the technology (i.e., Blackboard) would improve my performance in the program.	.7777
40. I would find the technology useful in my program.	.7855
41. Using the technology in the program would enhance my productivity.	.7392
47. Throughout the duration of the course/program, students have convenient access to technical assistance.	.4977
49. I am satisfied with my decision to take this course via the Internet.	.7478
50. If I had another opportunity to take a course via the Internet I would gladly do so.	.6042
51. My choice to take this course via the Internet was a wise one.	.7730
52. I was very satisfied with this course.	.9121
53. I feel that this course served my needs well.	.8935
54. Conducting the course via the Internet improved the quality of the course compared to other courses.	.6781
55. I will take as many courses via the Internet as I can.	.6924
56. The quality of the course compared favorably to my other courses.	.6386
57. I feel the quality of the course I took was largely unaffected by conducting it via the Internet.	.5412
58. I was disappointed by the way this course worked out. (reverse coded)	.8429
59. If I had to do it over, I would not take this course via the Internet. (reverse coded)	.5987
60. Conducting this course via the Internet made it more difficult than other courses I have taken. (reverse coded)	.7327

4.4. Procedure

One instructor affiliated with the main campus delivered the Web survey to students after four completed online courses in four consecutive semesters. Students were anonymous. Eighty-four students had participated in the four courses (20, 22, 21, 21); 82 students completed the survey, for a response rate of 98%. Eighty-two surveys were valid and analyzed.

Table 4
Factor loadings

	Loading
Factor 1, 14 items	
2. The advantages of taking this class via the Internet outweighed any disadvantages.	.649
16. Students are learning to identify central issues.	.794
17. Students are learning to interrelate important issues.	.758
18. Students are developing the ability to communicate clearly about the subject.	.672
23. Learning outcomes for each course are clearly summarized.	.609
28. Interacting with other students and with the instructor became more natural as the course progressed.	.577
38. Using the technology (i.e., Blackboard) would improve my effectiveness in the program.	.794
39. Using the technology (i.e., Blackboard) would improve my performance in the program.	.878
49. I am satisfied with my decision to take this course via the Internet.	.729
51. My choice to take this course via the Internet was a wise one.	.822
52. I was very satisfied with this course.	.760
53. I feel that this course served my needs well.	.695
55. I will take as many courses via the Internet as I can.	.816
58. I was disappointed by the way this course worked out. (reverse coded)	.779
Factor 2, 13 items	
3. Taking this class via the Internet allowed me to spend more time on non-work-related activities.	.853
14. Students are learning factual material.	.897
15. Students are gaining a good understanding of basic concepts.	.784
19. Students are developing the ability to integrate facts and develop generalizations.	.513
20. Clearly outlined objectives and outcomes are provided.	.566
27. The instructor frequently attempted to elicit student interaction.	.844
29. I felt that the quality of class discussions was high throughout the course.	.660
30. It was easy to follow class discussions.	.705
36. Feedback on student assignments and questions is constructive.	.635
40. I would find the technology useful in my program.	.831
41. Using the technology in the program would enhance my productivity.	.819
59. If I had to do it over, I would not take this course via the Internet. (reverse coded)	.553
60. Conducting this course via the Internet made it more difficult than other courses I have taken. (reverse coded)	.557
Factor 3, 8 items	
24. Student to student interaction was more difficult than in other courses. (reverse coded)	−.782
25. Class discussions were more difficult to participate in than in other courses. (reverse coded)	.808

Table 4 (*continued*)

	Loading
Factor 3, 8 items	
26. I learned more from my fellow students in this course than in any other course.	.612
33. Student to instructor interaction was more difficult than in other courses. (reverse coded)	− .828
34. Student interaction with faculty and other students is frequent.	.629
54. Conducting the course via the Internet improved the quality of the course compared to other courses.	.545
56. The quality of the course compared favorably to my other courses.	.593
57. I feel the quality of the course I took was largely unaffected by conducting it via the Internet.	.691
Factor 4, 4 items	
1. Taking this class via the Internet allowed me to arrange my work for the class more effectively.	.807
5. Taking this class via the Internet allowed me to arrange my work schedule more effectively.	.555
21. Students are actively engaged in the learning process.	.806
50. If I had another opportunity to take a course via the Internet I would gladly do so.	.594
Factor 5, 3 items	
37. Feedback on student assignments and questions is provided in a timely manner.	.707
47. Throughout the duration of the course/program, students have convenient access to technical assistance.	.584
11. Students have access to sufficient library resources accessible through the World Wide Web.	.899
Factor 6, 1 item	
8. Taking this class via the Internet should enable me to finish my degree earlier.	.865
Factor 7, 2 items	
31. Classroom dynamics were not much different than in other courses.	.619
32. Once we became familiar with the technology (i.e., Blackboard) it had very little impact on the class.	.784
Factor 8, 2 items	
35. Student interaction with faculty and other students is facilitated through a variety of ways.	.730
12. Questions directed to student service personnel answered accurately, quickly.	.480
Factor 9, 1 item	
4. There were no serious disadvantages to taking this class via the Internet.	.618

4.5. Limitations

There is one major limitation to be noted in this study. The students surveyed were enrolled in a part-time MBA program with course offerings both online and in a traditional classroom setting. This MBA student population may vary in terms of online course needs from other student populations. This may prevent the findings from this study from being generalized to a variety of programs that are offered completely online. As the number of online degree programs increases, there will be more opportunities to evaluate this model with other samples.

5. Results

Means for all 60 questionnaire items are listed in Table 1. Univariate analysis did not indicate any problematic issues with items. The initial reliability analysis with the current sample reveals an alpha coefficient of .95, which certainly indicates internal consistency. Most of all the items are contributing to the quality measure. However, the reliability analysis indicated that the deletion of several items would improve the reliability of the survey. Correlation analysis confirmed the lack of consistency in these items. Any item with an item-to-total correlation below .40 was eliminated. Table 2 provides the deleted items with their item-to-total correlations.

Eliminating the 12 items with low item-to-total correlations, as indicated by the analysis, improved the alpha coefficient to .96. Table 3 contains the resulting interitem correlations.

The goal of the analysis is to provide data summary on the items measuring online quality.

Because this is the first attempt to provide a comprehensive measure of quality in an online program and a review of existing research indicated that several constructs may underlie the concept of quality in online education, an exploratory factor analysis (EFA) was performed to determine what, if any, constructs result from this data set. Varimax rotation with principal component analysis was performed to achieve a theoretically meaningful factor pattern. Nine factors emerged, accounting for 85% of overall variance (an effective factor analysis will usually account for 60–70% of variability). Table 4 contains the variables loading on each factor.

The analysis provides a clean factor structure; however, items do not load as proposed earlier in this manuscript.

The scale seems to demonstrate face and construct validity as indicated by prior research in this field investigated earlier in this paper. From the EFA, it is evident that the scale exhibits factorial convergent and discriminant validity. That is, those items that do correlate with a factor correlate more highly with that factor than with any other.

6. Discussion

Based on current research regarding the evaluation of quality in online programs, nine constructs indicated by a total of 60 items are proposed to demonstrate quality and learning effectiveness in online programs. The first issue to be addressed is reliability, or consistency.

The initial reliability analysis with the current sample reveals an alpha coefficient of .95, which indicates significant interitem correlation. Most of all the items are contributing to the quality measure. Because the goal is to improve the reliability of the measure, the alpha coefficient is improved to .96 once the 12 items with low item-to-total correlations are eliminated, as indicated by the analysis.

Reliability, however, does not ensure validity. Validity is the extent to which the items accurately measure what they are supposed to measure, in this case, quality in online education. One type of validity evaluation useful is face validity, or validity that is assessed through examination of the questionnaire itself to determine if it does indeed represent the theoretical construct of quality in online education. As these items were adopted from a variety of research studies conducted by institutions and individuals pioneering Internet-based education, face validity is assumed from the original authors' qualitative and quantitative research. Further, the scale seems to demonstrate both factorial convergent and discriminant validity. That is, those items that do correlate with a factor correlate more highly with that factor than with any other. The factor analysis, however, raises some issues in construct validity.

A factor analysis provides a method for summarizing a large set of data with multiple variables. Additionally, it may provide some clarity in examining interrelationships among data that a correlation analysis may have missed. Seven constructs were initially proposed to measure quality in online programs: flexibility, responsiveness and student support, student learning, interaction, technology, technical support, and student satisfaction. As discussed earlier in the paper, 60 items were also proposed to load on each of the seven constructs. Nine factors emerged from the current analysis, the 60 items indicating a greater number of constructs than proposed, with the 60 items also loading differently than initially proposed.

Most of the items loading on Factors 1 and 2 relate to course organization and student learning (students are learning to identify and interrelate central issues, learning outcomes are clearly summarized, students are satisfied with this course). Thirteen items relating to student learning, interaction, and delivery mode load on the second factor. (Students are learning factual material, gaining a good understanding of basic concepts, instructor attempted to elicit student interaction, taking this course via the Internet enabled me to spend time on non-work-related activities, conducting this course via the Internet made it more difficult than other courses I have taken.) Factor 3 seems to focus on quality and interaction (the quality of the course was largely unaffected by conducting it via the Internet, the quality of the course was favorable compared to other courses, student interaction was more difficult than other courses, class discussions were more difficult to participate in). The last six factors that emerged from the analysis (Table 4) are rather small; these factors could be combined to compose yet another factor. All factor loadings are strong, with a minimum loading of .480.

From this preliminary analysis, results indicate a four-factor model representing quality in online learning. It appears, however, that more detailed analyses may be necessary before any further interpretation of the model is presented and to determine the stability of the factors identified in the proposed model.

7. Future research and conclusion

The author of this study attempted to investigate current research regarding the measurement of quality in online programs. The resulting constructs find their base in both the information technology and distance education literatures. This model is the first proposed to address issues of flexibility, responsiveness, interaction, student learning, technical support, technology, and student satisfaction simultaneously. The current literature on Internet-based courses suggests that these variables may indicate quality and learning effectiveness in online programs. The statistical analysis performed in this study indicates that although the items measuring these constructs demonstrate validity and reliability, they may not conform to the proposed factor structure that was suggested via the literature review.

Additional research is needed to validate the preliminary findings for the online quality measure and its factor structure with more representative samples of online education consumers. In addition, subsequent research should utilize both exploratory and confirmatory factor analyses techniques to further examine the factor structures and loadings for quality indicators of online programs.

Future research should include additional empirical investigations of the reliability and validity of this model. As Internet-based education continues to grow worldwide, this model may assist policymakers, faculty, students, and others in making reasonable and informed judgments with regard to the quality of and learning in Internet-based distance education.

References

Alavi, M. (1994). Computer-mediated collaborative learning: an empirical evaluation. *MIS Quarterly*, *18*, 159–174.

Alavi, M., Wheeler, B. C., & Valacich, J. S. (1995). Using IT to re-engineer business education: an exploratory investigation of collaborative telelearning. *MIS Quarterly*, *19*, 293–312.

Alavi, M., Yoo, Y., & Vogel, D. R. (1997). Using information technology to add value to management education. *Academy of Management Journal*, *40*(6), 1310–1333.

American Distance Education Consortium, (1999). *ADEC Guiding principles for distance learning and teaching*. Available at: http://www.adec.edu/papers/distance-teaching_principles.html.

Arbaugh, J. B. (2000a). Virtual classroom characteristics and student satisfaction in Internet-based MBA courses. *Journal of Management Education*, *24*(1), 32–54.

Arbaugh, J. B. (2000b). Virtual classroom versus physical classroom: an exploratory comparison of class discussion patterns and student learning in an asynchronous Internet-based MBA course. *Journal of Management Education*, *24*(2), 207–227.

Arbaugh, J. B. (2000c). How classroom environment and student engagement affect learning in Internet-based MBA courses. *Business Communication Quarterly*, *63*(4), 9.

Arbaugh, J. B. (2002). Managing the on-line classroom—A study of technological and behavioral characteristics of Web-based MBA courses. *Journal of High Technology Management Research*, *13*(2), 203–223.

Atkinson, M., & Kydd, C. (1997). Individual characteristics associated with World Wide Web use: an empirical study of playfulness and motivation. *The DATA BASE for Advances in Information Systems*, *28*(2), 53–62.

Bagozzi, R. P., Davis, F. D., & Warshaw, P. R. (1992). Development and test of a theory of technological learning and usage. *Human Relations*, *45*(7), 659–686.

Clarke, R. D. (1999, April). Going the distance. *Black Enterprise*, *29*, 113–118.

Davis, F. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, *35*(8), 982–1003.

Fresen, J. (2002, January–February). Quality in Web-supported learning. *Educational Technology*, *42*(1), 28–32.

Gibson, C., & Gibson, T. (1995). Lessons learned from 100+ years of distance learning. *Adults Learning*, *7*(1), 15.

Graham, M., & Scarborough, H. (2001). Enhancing the learning environment for distance education students. *Distance Education*, *22*(2), 232–244.

Greco, J. (1999). Going the distance for MBA candidates. *Journal of Business Strategy*, *20*(3), 30–34.

Gronroos, C. (1978). A service-oriented approach to marketing of services. *European Journal of Marketing*, *12*(8), 588–601.

Harasim, L. (1990). Online education: an environment for collaboration and intellectual amplification. In L. Harasim (Ed.), *Online education: perspectives on a new environment* (pp. 133–169). New York: Praeger.

Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks*. Cambridge, MA: MIT Press.

Hiltz, S. R., & Wellman, B. (1997). Asynchronous learning networks as a virtual classroom. *Communications of the ACM*, *40*(9), 44–49.

Li, O. (2002). Exploration of collaborative learning and communication in an educational environment using computer-mediated communication. *Journal of Research on Technology in Education*, *34*(4), 503–516.

McGinn, D. (2000). College online. *Newsweek*, *135*(17), 54–58.

Parasuraman, A., Berry, L., & Zeithaml, V. (1985, Fall). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 41–50.

Parasuraman, A., Berry, L., & Zeithaml, V. (1988, Spring). SERVQUAL: a multiple item scale for measuring consumer perceptions of SERVQUAL. *Journal of Marketing*, *68*(1), 112–140.

Parasuraman, A., Berry, L., & Zeithaml, V. (1994). Alternative scales for measuring service quality: a comparative assessment based on psychometric and diagnostic criteria. *Journal of Retailing*, *70*(3), 193–199.

Phipps, R., & Merisotis, J. (1999). What's the difference? *A review of contemporary research on the effectiveness of distance learning in higher education*. Washington, DC: The Institute for Higher Education Policy. Available at: http://www.ihep.com/org.php/parm=Press/PR15.htm.

Russel, T. (1997). *The "no significant difference" phenomenon*. Available at: http://tenb.mta.ca/phenom/phenom.html.

Sherry, L. (1995). Issues in distance learning. *International Journal of Educational Telecommunications*, *1*(4), 337–365.

Sistek-Chandler, C. (2000, April). Webifying courses: online education platforms. *Converge*, 34–38.

Sonwalkar, N. (2002, Jan). A new methodology for evaluation: the pedagogical rating of online courses. *Syllabus*, *15*(6), 18–21.

Thach, E. C., & Murphy, K. L. (1995). Competencies for distance education professionals. *Educational Technology Research and Development*, *43*(1), 57–79.

University of Illinois. (1999, December 7). *Teaching at an Internet distance: the pedagogy of online teaching and learning.* University of Illinois Faculty Seminar.

Warkentin, M. E., Sayeed, L., & Hightower, R. (1997). Virtual teams versus face-to-face teams: an exploratory study of a Web-based conference system. *Decision Sciences*, *28*(4), 975–996.