

Students' Perceptions of Online-learning Quality given Comfort, Motivation, Satisfaction, and Experience

Michael C. Rodriguez
University of Minnesota

Ann Ooms
Kingston University, UK

Marcel Montañez
New Mexico State University

Abstract

Understanding factors in successful online course experiences can provide suggestions for instructors and students to promote improved learning experiences. A survey of 700 students regarding perceptions of online-learning quality was analyzed with a structural equation model. For students with online-learning experience, comfort with technology and motivation to learn technology skills were related to satisfaction with online courses, which was related to perceived quality. For students with hybrid-learning experience, comfort was related to motivation and perceived quality, motivation was related to satisfaction, and satisfaction was related to perceived quality. For students with no online-learning experiences, comfort was related to motivation to learn technology skills, but neither of these factors was related to perceived quality of online courses.

Introduction

Technological advances since the 1990s have led to increasing integration of web-enhanced and web-based resources into instructional practices. It is difficult to find a higher education course that does not employ or take advantage of technology in some way. The number of online courses offered by different colleges and universities is growing at an astonishing rate. During the 2000-2001 academic year, 56% of all 2-year and 4-year degree granting institutions offered online courses, while an additional 12% were planning on offering online courses within the following 3 years; this included 127,400 online courses attracting an enrollment of over 3 million (National Center for Educational Statistics, 2003).

Some educators are exploring the use of more emerging technologies such as mobile technologies and Second Life into their teaching practices, whereas many others are incorporating technologies such as Moodle, WebCT, or Blackboard to create hybrid course experiences. Maybe it is time to stand still in a fast moving world and ask ourselves: What do students really think about the use of online-learning environments? We recognize that faculty and students are important stakeholders in the learning environment and propose to build a line of research to investigate factors that explain experiences of both online and hybrid courses.

Modifying existing face-to-face courses to meet the specific characteristics of online-learning environments requires a great deal of effort and resources. Financial costs have been the

largest source of reluctance: 26% of institutions reported that program development costs kept them from starting or expanding online course offerings. For the 31% of institutions that did not offer online courses, reasons included lack of fit with mission (44%), development costs (33%), concerns about course quality (26%), limited technological infrastructure (24%), and lack of perceived need (22%) (National Center for Educational Statistics, 2003).

Researchers have investigated the quality of online versus face-to-face instruction. Authors of a recent meta-analysis (Bernard et al., 2004) focused on student achievement, attitudes, and retention. Small significant effects favored distance education on all three measures; yet effect sizes of all measures varied a great deal which calls for careful interpretation of this body of research. Authors of an earlier meta-analysis (Allen, Bourhis, Burrell, & Mabry, 2002) indicated that students slightly prefer face-to-face courses over online courses. However, after removal of three identified outliers, there were no differences in student satisfaction.

Although our focus is on the perceptions of students, as a reviewer rightly pointed out, the success of online courses rests in the experiences of both students and instructors. Regarding student experience, as with any product, educational or otherwise, perception in an open marketplace, much like the educational course-taking marketplace, may ultimately determine whether students continue to enroll in online courses. Student motivational dispositions and perceived value of distance education and uses of educational technology are areas in need of further investigation (Bernard et al., 2004).

Perspectives

Higher education institutions face a tremendous challenge in designing effective and sustainable online courses. There has been extensive discussion to identify the key components of successful instructional design to increase the outcomes of online learning (Gunawardena, Lowe, & Carabajal, 2000; Kreijns, Kirschner, & Jochems, 2003; Mallen, Day, & Green, 2003). Researchers have created specific evaluation models to measure the outcomes of online learning (Gunawardena, Carabajal, & Lowe, 2001; Jones & Paolucci, 2000). Student satisfaction with online courses appears to be a multidimensional concept, including learner-instructor interaction, learner-learner interaction, learner-content interaction, course organization, support services/administrative issues, facilitator, technical support, and delivery method (Roberts et al., 2005).

Engaging in an online-learning process requires a certain level of comfort with computer and web technologies (Lee & Witta, 2001). In order to fully participate in online instructional activities, to access instructional materials, and to interact with an instructor and peers, students need to be able to use a variety of modern hardware and software applications. Lacking the required technical skills can be a source of computer anxiety (Loyd & Gressard, 1984) and even become a barrier to learning (Cheurprakobkit, Hale, & Olson, 2002). Those students must invest extra effort in learning the necessary technology skills while being expected to simultaneously master new course content. Online learning requires access and know-how.

There has been some controversy regarding the relation between the level of comfort of using the Internet and the degree of student satisfaction with online courses. Being at ease with the Internet may not explain satisfaction with online learning (DeBourgh, 1999; Westbrook, 1999). However, Stokes (2003) found a significant relation between the two variables; students who felt more at ease using the Internet were more likely to be satisfied with their online-learning experiences than those students who did not feel comfortable using the Internet. It appears that in some cases, comfort with online learning may be related to satisfaction.

Researchers are making contributions, uncovering various elements of online experience. Students taking an online course were more satisfied with their learning experiences than students enrolled in a similar face-to-face course (Wright, 1999). Satisfaction with online learning was not influenced by the quantity of previous online-learning experiences; yet there was a significant difference between more- and less-experienced users in this context (Stokes, 2003). There might be a connection between a student's first online-learning experiences and their satisfaction (Wegner, Holloway, & Garton, 1999). Student characteristics such as age, perception of computer skills, knowledge of electronic communication technology, number of web courses taken, and distance from main campus did not influence student satisfaction; satisfaction was determined by what takes place in the online classroom (Thurmond, Wambach, Connors, & Frey, 2002).

Bernard et al. (2004) searched through over 2200 abstracts concerning distance education and traditional classroom-based instruction, identifying 232 studies that met their selection criteria for their meta-analysis. In this set, three outcomes were analyzed, including achievement, attitude, and retention. Attitude measures were largely subjective reactions or expressions of satisfaction of any number of aspects of the courses studied (attitudes toward technology, subject matter, instructor, and the course). Overall, there was a small effect in favor of direct classroom instruction in terms of attitude, and variance in attitude measures were partially explained by study methodology and quality (e.g., type of publication, treatment duration, selection bias), pedagogical practices of the instructor (e.g., systematic instructional design, opportunity for face-to-face contact with instructor and peers, opportunities for mediated communication, use of problem-based learning), and the use of multiple sources of media (e.g., use of the Web, audio/video conferencing, email, computer-based instruction). The attention to online course taking experience suggests that the field believes it matters. How it matters exactly is still under investigation.

Purpose

We investigated the relations among several variables that may impact the degree of students' satisfaction with online-learning experiences and perceived quality. These variables were chosen based on previous research and those that could be considered to promote high quality online course development and marketing. Early identification of relevant variables could provide the means to increase the likelihood of positive online-learning experiences. For example, if a limited level of technology skills jeopardizes attainment of positive learning experiences, students could be referred to the appropriate resources to gain the essential technology skills before they enroll for an online course.

Several research questions stem from the literature review and were addressed in this project. These questions move us beyond the comparison of specific course-related experiences (online versus classroom experiences) to a more holistic and system-wide view of learning experiences. These questions are framed around a central issue related to perceived quality of online-learning experiences.

- What are the general learning experiences and technological support needs of students regarding online courses?
- What do students report regarding comfort with technology, satisfaction with prior online-learning experiences, and motivation to learn computer-based technology skills?
- What are the perceptions of online-learning quality given different levels and formats of experience with online learning?

- Do perceptions of quality of online learning relate to comfort with technology, satisfaction with prior online-learning experiences, and motivation to learn computer-based technology skills?

The model includes (a) level of comfort with technology, (b) motivation to learn technology skills, (c) level of satisfaction with previous online-learning experiences, and (d) perceived quality of online courses. These constructs were measured with the online survey of graduate and professional students. Level of comfort was measured with a set of items listed below (items rated on a 4-point scale); motivation to learn (4-point scale), satisfaction (6-point scale), and perceived quality (4-point scale) were each measured with a single item.

The model employs satisfaction as both an outcome and a moderator with perceptions of quality as the ultimate outcome of concern. We assessed their relations with a structural equation model to provide a more complete picture. Primary outcomes included satisfaction with the learning experience and perceived quality of the learning experience.

Methods

A survey was developed, reviewed by instructional technology experts and researchers, and piloted with a sample of the target audience prior to administration. This survey was administered online. Pre-survey e-mail notices, invitations with the survey site link, and reminders about the survey were sent to the approximately 3000 enrolled students in a post-BA, professional, and graduate school of education in a Midwest Research-I University. The survey was made available via the Internet for 4 weeks. This resulted in 721 completed surveys for a 24% response rate. We expect that the functional response rate was likely over 50% as many of the 3000 students were inactive or no longer attending (there was no way to easily remove these students without additional authorization). In all, 698 surveys were usable in this project, as 23 contained significant missing responses, resulting in a valid response rate of 23% (ignoring inactive students). This project was developed as a preliminary step in ongoing research. As will become evident below, we hope to develop stronger measurement models of the constructs involved in understanding the factors that may influence perceptions of quality.

Three relevant groups of students were identified for comparison purposes, including (a) students with online-learning experience, (b) students with hybrid-learning experience (courses incorporating an online-learning component), and (c) students with no online-related learning experience (students without online-learning or hybrid-learning experience). The survey allowed students to reflect on their online-learning experiences at any time prior to the survey, regardless of the institution at which the course was offered or course content—essentially, any online-learning experiences that have contributed to their satisfaction and perceptions of quality.

Survey responses were factor scored (based on a principal-axis factor analysis) to create the comfort with technology scale. Scores for other variables were used as reported on the survey. All responses were submitted to a structural equation model employing AMOS 4.0 (Arbuckle, 1999). Other descriptive analyses were completed using SPSS.

Results

Among the 698 students with complete surveys, 39% were 16 to 25-years-old, 38% were 26 to 35-years-old, 13% were 36 to 45-years-old, and 10% were 46-years-old or older. There were no statistically significant age differences between those students with online-learning

experience, those with hybrid-learning experience, and those with no online-related learning experience ($\chi^2=16.6, p=.09$).

Distance from campus was not related to number of online courses taken, and was not related to satisfaction or perceived quality for any of the three groups. Just over half (53%) the students reported to live within 10 miles from campus, 29% between 11 and 20 miles, and 18% more than 21 miles. Because distance from campus was not related to number of online courses taken, satisfaction, or perceived quality, it was not considered as a covariate in the final model.

Most students felt comfortable with basic computer-based technology activities, such as using email, typing, accessing the Web, sending, receiving, and downloading documents. Fewer students felt comfortable with more advanced activities, including downloading multimedia materials, listening to audio or viewing video on the computer (see Table 1).

Table 1

Comfort Level with Computer-Based Technology Activities (n = 698)

	Mostly uncomfortable	Somewhat uncomfortable	Somewhat comfortable	Mostly comfortable
Using email	5%	0%	2%	92%
Typing, key boarding	6%	1%	6%	87%
Accessing the Web	6%	1%	6%	88%
Sending documents electronically	8%	8%	21%	63%
Receiving documents electronically	7%	5%	22%	66%
Downloading documents	8%	10%	27%	55%
Downloading multimedia materials	15%	23%	34%	29%
Listening to audio on the computer	13%	15%	28%	44%
Viewing video on the computer	17%	19%	31%	33%

Comfort with technology, as described above, was not related to the number of online courses taken; students with online-learning experience, hybrid-learning experience, or no online-related learning experience reported the same level and range of comfort ($F[2,695]=0.01, p=.99$). In addition, there was a nonsignificant correlation between comfort and number of online courses taken ($r=.08, p=.30$), which further suggests no relation between comfort with technology and number of online courses taken.

Students reported high levels of motivation to learn technology skills; 31% reported excellent motivation, 44% good motivation, 22% fair motivation, and 3% poor motivation. There were small correlations between motivation to learn and level of comfort with advanced technology skills (Spearman $\rho \approx .25$ to $.28$). There was a weak correlation between motivation to learn and age (Spearman $\rho \approx .19$). All Spearman correlations between age and comfort levels with specific computer-based technology activities were less than $.15$.

Half of all students (51%) had experience with hybrid courses only (no online course experience). Of these students, the perceived helpfulness of the online-learning component was not unanimous; 14% reported that the online-learning component was very helpful, 39%

moderately helpful, 36% a little helpful, and 11% not helpful at all. Fewer students, nearly one-fourth (24%), had taken online courses; 89% of these students also had hybrid course experience. Of those who had taken online courses, 22% had taken more than one. Satisfaction with online courses was relatively high (Table 2). The remaining one-fourth (25%) had neither hybrid-course nor online-course experience.

Table 2
Satisfaction with Online Courses (n=168)

	Percent
Completely dissatisfied	1.8
Mostly dissatisfied	8.9
Somewhat dissatisfied	11.9
Somewhat satisfied	24.4
Mostly satisfied	39.9
Completely satisfied	13.1

Students reported to like several aspects of online courses (Table 3). Mostly, they appreciated the flexibility of study time (48%) and less need to go to campus (24%). On the other hand, students least liked the limited face-to-face interaction (49%).

When asked to imagine taking an online course, students with hybrid or no online-related learning experience reported to liking the fact that there would be less need to go to campus (39%), flexibility of study time (23%, half compared to students with online-learning experience [48%]), and flexibility of study location (20%, similar to those with online-learning experience). On the other hand, students reported to not liking the limited face-to-face interaction (68%) at a higher rate than student with online-learning experience (49%) and being reliant on their own self-discipline (13%, similar to those with online-learning experience; see Table 3).

Table 3
What do you like most or least about taking Online Courses? (Percentages Reporting)

	With online-learning experience (n = 168)		With hybrid or no online-related learning experience (n = 530)	
	Like most	Like least	Like most	Like least
The online delivery methods	1.8	11.4	3.0	7.0
Limited face-to-face interaction	3.0	49.1	0.6	67.9
Flexibility of study location	14.9	0.6	19.7	0
Reliance on my own self-discipline	4.8	12.6	3.4	14.6
Flexibility of study time	47.6	0.6	31.7	0
Spending less time on the computer	0	9.0	0.6	6.1
Less need to go to campus	23.8	0.6	38.5	0.2

When asked about technical support necessary to take online courses, students with hybrid or no online-related learning experience reported needing more support than students with online-learning experience. More students with hybrid or no online-related learning experience

reported needing assistance by telephone available 24 hours a day (45% versus 19%), and assistance by email available 24 hours a day (56% versus 32%). More of these students also reported the need for the required hardware (29% versus 12%) and software (67% versus 37%) to be provided by the university. Of the students with online-learning experience, 14% reported no need for assistance or equipment at all, whereas only 1% of students with hybrid or no online-related learning experience reported no need at all (see Table 4).

Table 4

What kinds of technical support do you consider necessary? (Percentages Reporting)

	With online-learning experience ($n = 168$)	With hybrid or no online-related learning experience ($n = 530$)
Assistance by telephone available during regular office hours	37%	38%
Assistance by telephone available 24 hours a day	19%	45%
Assistance by e-mail available during regular office hours	31%	29%
Assistance by e-mail available 24 hours a day	32%	56%
University provided required hardware	12%	29%
University provided required software	37%	67%
No assistance or equipment necessary	14%	1%

Among students who had online-learning experience, half (52%) reported to agree that online courses meet the same quality standards as classroom courses (Table 5). Even so, 89% reported that they would consider registering for another online course, 11% would not.

Again, when asked to imagine taking an online course, fewer students (about 21%) with hybrid or no online-related learning experience reported to agree that online courses would meet the same quality standards as classroom courses compared to student with online-learning experience (52% agreeing; see Table 5).

Table 5

Online Courses meet the same Quality Standards as Classroom Courses

	With online-learning experience ($n=168$)	With hybrid-learning experience ($n=358$)	With no online-related learning experience ($n=172$)
Disagree	22.2	38.5	33.1
Tend to disagree	22.8	34.6	36.6
Tend to agree	33.5	15.6	18.0
Agree	18.0	5.6	4.1
Do not know	3.6	5.6	8.1

Structural Equation Models

As an initial set of analyses to understand the relations among the primary explanatory variables, we found independence between comfort with basic computer operations and

advanced computer operations as well as between comfort with technology (basic and advanced) and motivation to learn technology skills. In our sample, 51% of students had experienced hybrid courses. In all 24% had taken online courses, ranging between one online course (77%) to four or more online courses (4%).

Structural models were examined for three groups. Group one (Online; $n=168$) included the students who had previously taken on online course. Group two (Hybrid; $n=358$) was comprised of students who had experience taking a hybrid course and had not previously taken an online course. The third group (No online-related learning experience; $n=172$) had neither hybrid nor online-learning experience. The following is a comparative description of the fit of the structural model and path coefficients for the three groups.

To determine model fit, the chi-square goodness of fit test was used. Because chi-square statistic is dependent on sample size, three additional indices were also examined (Floyd & Widaman, 1995; Reise, Widaman, & Pugh, 1993). The Goodness of Fit (GFI), the Adjusted Goodness of Fit (AGFI) (Joreskog & Sorbom, 1989), and the Root Mean Square Error Approximation (RMSEA) (Steiger & Lind, 1980) indices were also examined. The GFI and AGFI indices range between 0 and 1 and .90 is a suggested acceptable value. An RMSEA value of .05 or less indicates a close fit to the data; .05-.10 a moderate fit; and above .10 is a poor fit (Browne & Cudeck, 1993). Overall the model fit was good for each group (see Table 6).

Table 6
Fit Statistics

Fit statistic	Group		
	Online	Hybrid	No online-related
<i>GFI</i>	.999	.998	1.00
<i>AGFI</i>	.995	.982	.826
<i>RMSEA</i>	.000	.029	.213
<i>Chi-Square, df, p</i>	.166, 1, $p=.68$	1.303, 1, $p=.25$.000, 0

Figure 1 represents the structural equation model for the online-learning experience group. Noteworthy features of this model include the positive relation between comfort and satisfaction as illustrated by the statistically significant standardized path coefficient (.15). The relation between satisfaction and perceived quality is also positive, significant, and much stronger (.51). These indicate that students who are more comfortable with technology are also more likely to be satisfied with online courses. This, in turn predicts higher levels of perceived quality with online courses. There is not a direct relation between comfort with technology and perceived quality of online courses (effect is nonsignificant). There is an indirect path from motivation to satisfaction (direct effect of .16) and finally to perceived quality (indirect effect of motivation on quality = $.16 \times .51 = .08$). Both paths were positive and significant indicating that students with higher levels of motivation are more likely to be satisfied with online courses and will ultimately have more positive perceptions of quality of online courses.

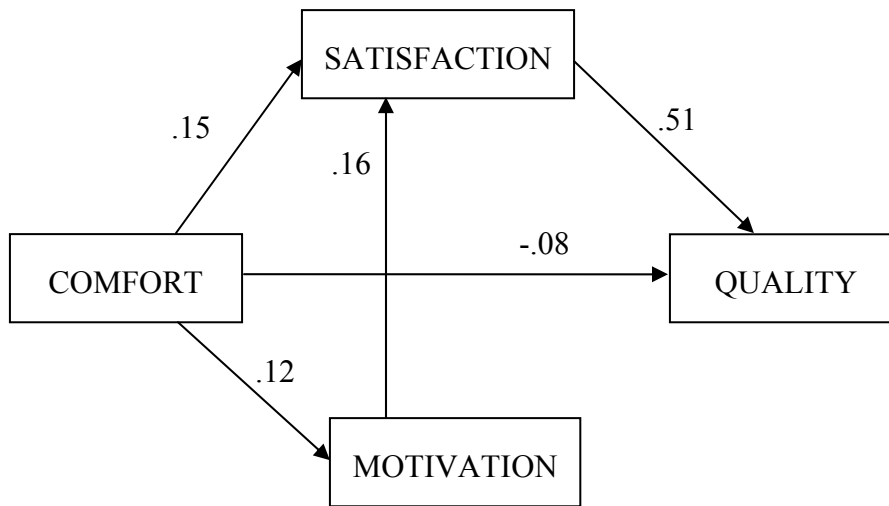


Figure 1. SEM model with standardized path coefficients for students with online-learning experience.

Figure 2 is a representation of the structural equation model for the hybrid-learning experience group. Significant paths were noted from comfort to motivation (.26), motivation to satisfaction (.14) and satisfaction to quality (.12). There was a positive, significant path from comfort to quality in this group; satisfaction was not predicted by comfort.

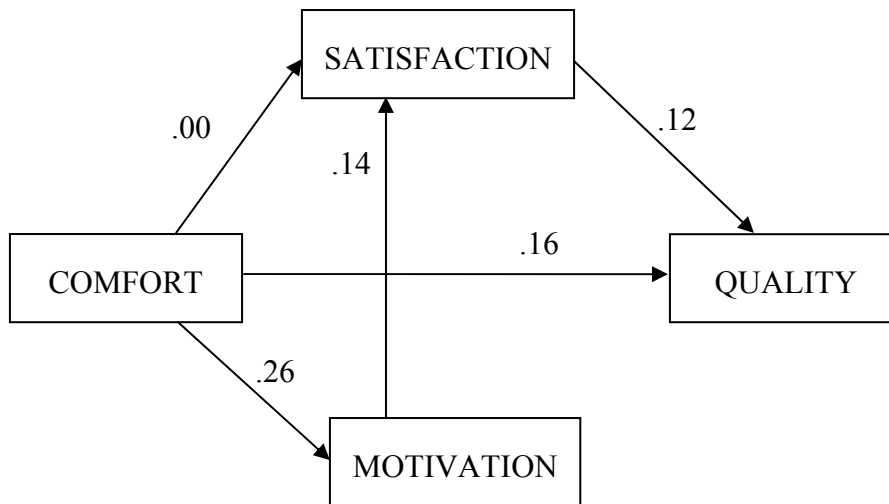


Figure 2. SEM model with standardized path coefficients for students with hybrid-learning experience.

The model for the group with no online-related learning experience was simplified (Figure 3) because no satisfaction variable was available with this group. Also, since they have never experienced online courses, the question about perceived quality of online courses versus classroom-based courses was worded slightly differently: “Imagine taking an online course. Do you disagree or agree that courses delivered entirely online would meet the same quality standards as classroom courses?” In this model the path from comfort to motivation was positive and significant (.38). Comfort did not predict perceived quality for the no experience group, nor

did motivation predict quality. For students with no online-related learning experience, perceptions of quality remain unexplained by comfort with technology and motivation to learn technology skills.

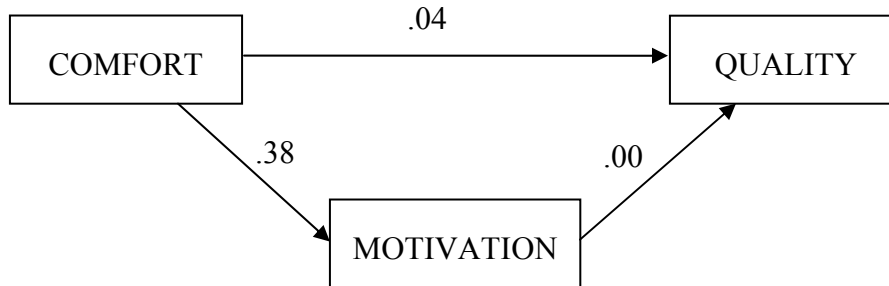


Figure 3. SEM model with standardized path coefficients for students with no online-related learning experience.

Table 7 can be used to compare standardized path coefficients between groups. Comfort was a significant predictor of perceived quality for the hybrid-learning experience group but not for the online-learning experience group. The strength of the relation between satisfaction and quality is nearly four times higher for the online-learning experience group than the hybrid-learning experience group. These coefficients indicate that for students who have never taken an online course, comfort with technology is predictive of motivation to learn technology skills. When students have previously taken on online course, the relation is not significant. For these students, comfort is significantly related to satisfaction with online courses and in turn is predictive of a positive perception of quality of online courses.

Table 7
Standardized Path Coefficients

Paths	Group		
	Online	Hybrid	No online-related
Comfort → Satisfaction	.15*	.003	-
Comfort → Quality	-.08	.16*	.04
Comfort → Motivation	.12	.26*	.38*
Motivation → Satisfaction	.16*	.14*	-
Satisfaction → Quality	.51*	.12*	-
Motivation → Quality	-	-	.00

* $p < .05$

Discussion

With models like these, measurement questions prevail: Are we measuring the right constructs? Are we measuring the constructs correctly? Only through replication and modification can we begin to answer these questions. This study advances this simple goal.

Comfort with computer operations and online technology tools does not appear to be related to number of online courses taken, which counters a common expectation that comfort limits course taking. However, we also found a negative relation between the number of online

courses taken and satisfaction. In all, 23% of the students who had online-learning experience were dissatisfied at some level, whereas 47% reported that the online-learning component of hybrid courses were less than helpful. This indicates an important area for study—satisfaction with online-learning experiences may prevail as a determining factor for the success of online courses in the future.

This is even more important with the finding of the relation between satisfaction and perceived quality of online courses. For students with online-learning experience, satisfaction with their experiences was a much stronger predictor of perceived quality of the courses than comfort with technology or motivation to learn technology skills; whereas both comfort and motivation were related to satisfaction.

For students with hybrid-learning experience, comfort was not related to satisfaction with the online-learning component and more strongly related to motivation, which in turn was related to satisfaction. For this group, comfort was slightly more related to perceived quality of online courses than was satisfaction with their hybrid-learning experience.

Finally, for students with no online-related learning experience, comfort was strongly related to motivation to learn technology skills, whereas neither was related to perceived quality. For students with limited or no online-related learning experience, perceptions of online-course quality were harder to predict. For those with online experience, satisfaction with such experiences was the overriding predictor. Recall from Table 3, that for students with online-learning experience, the most liked aspects included flexibility of study time, study location, and less need to go to campus. These were also the expected favorite aspects of students with no online-related learning experience. In addition, both groups reported to be less favorable about the limited face-to-face interaction, but those with no online-related learning experience were much more unfavorable (68%) about this aspect of online courses compared to students with online-learning experience (49%).

A reviewer offered an implication of this line of research: “Understanding some of the factors that may influence how participants perceive the quality of the activities (of hybrid versus online courses) permits incorporating experiences that promote these emotions or making certain participants have the prerequisite skills to maximize their online educational experiences.” Satisfaction with online courses is an important factor in explaining perceived quality of such courses. The argument is that perceptions of quality may determine whether students continue to enroll in such courses. Comfort with technology supports satisfaction with online courses but not hybrid courses; motivation to learn about technology supports satisfaction with online courses and hybrid courses. To support future success of students and their satisfaction with online courses as well as perceptions of quality, educators would do well to help prepare students for the technological demands of the course either through prerequisites or direct training. Motivation to engage and learn technological tools could easily be included as a prerequisite. Students who enroll in online courses (or hybrid courses for that matter) must be prepared and motivated to engage the tools needed to have successful learning experiences.

In today’s technologically oriented, information dependent economy, the availability of online courses will continue to increase. The success of higher education institutions entering the distance learning market will depend on greater understanding of the contexts investigated here. Further research in this area will also help target deeper research as we begin to understand components of perceived and realized satisfaction and quality of online-learning experiences. Although much larger samples will be needed to do so, looking at effects for course type (field, level of rigor, etc.) will also help in uncovering context specific nuances for targeting efforts in

this emerging field. Being able to understand the needs of students, support students in online courses, and promote successful learning experiences will be critical in the overall success of the online-learning arena.

References

- Allen, M., Bourhis, J., Burrell, N., & Mabry, E. (2002). Comparing student satisfaction with distance education to traditional classrooms in higher education: A meta-analysis. *The American Journal of Distance Education, 16*(2), 83-97.
- Arbuckle, J. L. (1999). Amos (Version 4.01) [Computer software]. Chicago, IL: SmallWaters Corporation.
- Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., Wallet, P. A., Fiset, M., & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379-439.
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp.136-162). Newbury Park, CA: Sage.
- Cheurprakobkit, S., Hale, D. F., & Olson, J. N. (2002). Technicians' perceptions about web-based courses: The University of Texas system experience. *The American Journal of Distance Education, 16*(4), 245-258.
- DeBourgh, G. A. (1999). *Technology is the tool, teaching is the task: Student satisfaction in distance learning*. Paper presented at the international conference of the Society for Information Technology and Teacher Education, San Antonio, TX.
- Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment, 7*(3), 286-299.
- Gunawardena, C. N., Lowe, C. A., & Carabajal, K. (2000). *Evaluating online learning: Models and methods*. Paper presented at the international conference of the Society for Information Technology and Teacher Education, San Diego, CA.
- Gunawardena, C. N., Carabajal, K., & Lowe, C. A. (2001). *Critical analysis of models and methods used to evaluate online learning networks*. Paper presented at the annual meeting of the American Educational Research Association, Seattle, WA.
- Jones, T. H., & Paolucci, R. (2000). Research framework and dimensions for evaluating the effectiveness of educational technology systems on learning outcomes. *Journal of Research on Computing in Education, 32*(1), 17-27.
- Joreskog, K. G., & Sorbom, D. (1989). *LISREL 7: A guide to the program and applications* (2nd ed.). Chicago, IL: SPSS.
- Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior, 19*, 335-353.
- Lee, C., & Witta, L. (2001). *Online students' perceived self-efficacy: Does it change?* Paper presented at the national convention of the Association for Educational Communications and Technology, Atlanta, GA.
- Loyd, B. H., & Gressard, C. (1984). The effects of sex, age, and computer experience on computer attitudes. *AEDS Journal, 18*(2), 67-77.
- Mallen, M. J., Day, S. X., & Green, M. A. (2003). Online versus face-to-face conversations: An examination of relational and discourse variables. *Psychotherapy: Theory, Research, Practice, Training, 40*, 155-163.

- National Center for Educational Statistics. (2003). *Distance education at degree-granting postsecondary institutions: 2000–2001*. Retrieved July 30, 2004, from <http://nces.ed.gov/surveys/peqis/publications>
- Reise, S. P., Widaman, K. F., & Pugh, R. H. (1993). Confirmatory factor analysis and item response theory: Two approaches for exploring measurement invariance. *Psychological Bulletin, 114*(3), 552-566.
- Roberts, T. G., Irani, R. A., Telg, R. W., & Lundy, L. K. (2005). The development of an instrument to evaluate distance education courses using student attitudes. *The American Journal of Distance Education, 19*(1), 51-64.
- Steiger, J. H., & Lind, J. M. (1980). *Statistically based tests for the number of common factors*. Paper presented at the annual meeting of the Psychometric Society, Iowa City, IA.
- Stokes, S. P. (2003). *Temperament, learning styles, and demographic predictors of college student satisfaction in a digital learning environment*. Paper presented at the annual meeting of the Mid-South Educational Research Association, Biloxi, MS.
- Thurmond, V. A., Wambach, K., Connors, H. R., & Frey, B. B. (2002). Evaluation of student satisfaction: Determining the impact of web-based environment by controlling for student characteristics. *The American Journal of Distance Education, 16*(3), 169-189.
- Wegner, S. B., Holloway, K. C., & Garton, E. M. (1999). The effects of Internet-based instruction on student learning. *Journal of Asynchronous Learning Networks, 3*(2), 98-106.
- Westbrook, T. S. (1999). Changes in student attitudes toward graduate instruction via Web-based delivery. *Journal of Continuing Higher Education, 47*(2), 32-38.
- Wright, V. (1999). *A Comparison of the achievement and perceived satisfaction of graduate students in synchronous and asynchronous courses*. Unpublished doctoral dissertation, The University of Alabama. Dissertation Abstracts International, 60, 06A.

Appendix: Online Learning Survey

1. Experiences with Technology

1.1. Where is the computer located that you PRIMARILY use to access the Internet?

- My home
- My workplace
- A University computer lab
- The library or other public location off campus
- The home of a friend or family member

1.2. What is your comfort level with the following computer related tasks? Assume here that the computer is functioning well.

	Mostly uncomfortable	Somewhat uncomfortable	Somewhat comfortable	Mostly comfortable	Does not apply
Using email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Typing, key boarding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessing the Web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sending documents electronically	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Receiving documents electronically	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Downloading documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Downloading multimedia materials (audio, video)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Listening to audio on the computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Viewing video on the computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1.3. How would you rate your motivation to learn more about using technology tools (like those mentioned in the previous question)?

- Poor
- Fair
- Good
- Excellent

1.4. Have you used WebCT before as part of a class?

- Yes [Please answer the next question: 1.5]
- No [You can skip question 1.5 and go to 1.6]

1.5. If yes, to what extent do you think WebCT was helpful to your learning?

- None
- A little helpful
- Moderately helpful
- Very helpful

1.6. Have you ever taken a course that was conducted primarily online, either here at the University or somewhere else?

The computer will take you where you need to go in the remainder of the survey.

- Yes [If yes, you will go to Section 2 and skip Section 3]
- No [If no, you will skip Section 2 and go to Section 3]

2. Experience with Online Courses

2.1. How many online courses have you taken?

- 1
- 2
- 3
- 4
- more than 4

2.2. Overall, to what extent are you dissatisfied or satisfied with the online course(s) you have taken?

- Completely dissatisfied
- Mostly dissatisfied
- Somewhat dissatisfied

- Somewhat satisfied
- Mostly satisfied
- Completely satisfied

2.3. What do you like MOST about taking online courses?

- The online delivery methods
- Limited face-to-face interaction
- Flexibility of study location
- Reliance on my own self-discipline
- Flexibility of study time
- Spending time on the computer
- Less need to go to campus
- Other (*Please specify*)

2.4. What do you like LEAST about taking online courses?

- The online delivery methods
- Limited face-to-face interaction
- Flexibility of study location
- Reliance on my own self-discipline
- Flexibility of study time
- Spending time on the computer
- Less need to go to campus
- Other (*Please specify*)

2.5. Do you disagree or agree that courses delivered entirely online meet the same quality standards as classroom courses?

- Disagree
- Tend to disagree
- Tend to agree
- Agree
- Do not know

2.6. What kinds of technical support do you consider to be NECESSARY if you were to take another online course? (check all you consider necessary)

- Assistance by telephone available during regular office hours
- Assistance by telephone available 24 hours a day (or a time frame close to that)
- Assistance by e-mail available during regular office hours
- Assistance by e-mail available 24 hours a day
- University provided required hardware
- University provided required software
- No assistance or equipment necessary

2.7. What is your MAIN financial concern when taking an online course?

- Being able to qualify for certain types of financial assistance
- Having to purchase additional equipment to take the class
- Covering the cost of books
- Paying for an Internet connection
- Paying an additional "online course fee"
- I do not have any financial concerns

2.8. Would you consider registering for another online course if the topic was of interest to you?

- Yes
- No

2.9. Would you advise a fellow student to take an online course if the topic was of interest to him or her?

- Yes
- No

3. Imagine Taking an Online Course

For the next few questions, please imagine that you are enrolled in an online course offered by the University. Rather than attending a lecture each week, you spend approximately the equivalent amount of time participating in your "class" on the Internet. Each time you log-in to your course on the web, you read new information posted by your professor regarding the course's current topic, you engage in electronic conversations about the topics with your classmates, and you work collaboratively and independently on various on-line projects and activities designed to reinforce class themes. Additionally, you spend time reading printed materials to prepare for each week's topic, much as you would in a classroom-based course. You are evaluated on your participation and contributions in the online discussions and your demonstration of mastery of the materials and concepts through written essays and projects.

3.1. What would you like MOST about taking online courses?

- The online delivery methods
- Limited face-to-face interaction
- Flexibility of study location
- Reliance on my own self-discipline
- Flexibility of study time
- Spending time on the computer
- Less need to go to campus
- Other (*Please specify*)

3.2. What would you like LEAST about taking online courses?

- The online delivery methods
- Limited face-to-face interaction
- Flexibility of study location
- Reliance on my own self-discipline
- Flexibility of study time
- Spending time on the computer
- Less need to go to campus
- Other (*Please specify*)

3.3. Do you disagree or agree that courses delivered entirely online would meet the same quality standards as classroom courses?

- Disagree
- Tend to disagree
- Tend to agree
- Agree
- Do not know

3.4. What kinds of technical support do you consider to be NECESSARY if you were to take an online course? (check all you consider)

- Assistance by telephone at regular office hours
- Assistance by telephone at 24 hours (or a time frame close to that)
- Assistance by e-mail at regular office hours
- Assistance by e-mail at 24 hours

- University provided required hardware
- University provided required software
- None are necessary

3.5. What would be your MAIN financial concern if you were to take an online course?

- Being able to qualify for certain types of financial assistance
- Having to purchase additional equipment to take the class
- Covering the cost of books
- Paying for an Internet connection
- Paying an additional "online course fee"
- I would not have any financial concerns

4. Additional Information

We appreciate your input in the above questions. To help us understand responses from various groups of students and the issues related to student characteristics, we would also appreciate some information about you. Again, this information will not be linked to you in any way and will only be used for comparative purposes.

4.1. Please indicate your current registration status.

- Degree seeking
- Certificate seeking
- Non-degree seeking

4.2. Please indicate your age within the following ranges.

- 16-25 years
- 26-35 years
- 36-45 years
- 46-55 years
- 56-65 years
- 66-75 years
- 76 or more years

4.3. When is the MOST convenient time for you to come to the University for classes?

- Week days

- Week evenings
- Weekends
- There really is no convenient time.
- Basically anytime is convenient for me.

4.4. What is the approximate distance between your place of residence and the University?

- 0 - 10 miles (0 - 16 kilometers)
- 11 - 20 miles (17 - 32 kilometers)
- 21 - 50 miles (33 - 80 kilometers)
- 51 - 100 miles (81 - 160 kilometers)
- More than 100 miles (160 kilometers)

Acknowledgements

We would like to thank Yelena Yan, an online instructional designer in the College of Education & Human Development, University of Minnesota, for her review and comments on our work. We also thank all of the students who participated in the survey. Finally, we thank the JIOL editorial team and reviewers for their thoughtful and helpful comments.