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Student Barriers to Online Learning: A factor analytic study

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This article reports on a large-scale (n = 1,056), exploratory factor analysis study that determined the underlying constructs that comprise student barriers to online learning. The eight factors found were (a) administrative issues, (b) social interaction, (c) academic skills, (d) technical skills, (e) learner motivation, (f) time and support for studies, (g) cost and access to the Internet, and (h) technical problems. Independent variables that significantly affected student ratings of these barrier factors included: gender, age, ethnicity, type of learning institution, self-rating of online learning skills, effectiveness of learning online, online learning enjoyment, prejudicial treatment in traditional classes, and the number of online courses completed.

Introduction

As the popularity of the Internet grows, so does the potential for online learning. A great deal of evidence exists showing that no significant differences should be expected regarding the *effectiveness* of well-designed online learning compared with well-designed in-person learning (Clark, 1983; Russell, 1999). Despite this, significant differences still exist in the way students perceive their online experiences during learning. To the extent that these students' perceptions are negative regarding their past, present, or future online learning experiences, the students' perceptions may contribute to such outcomes as higher dropout rates (Carr, 2000), low motivation of students to learn (Maltby & Whittle, 2000), and lower student satisfaction with the learning experience (Kenny, 2003). Still, these outcomes are not true for all students, in all situations, and at all times. What causes individual differences in outcomes for online learners?

Research on individual differences among students is conducted to increase our ability to design instruction, to improve how we instruct, and to advise students. In

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part, we want to better understand which students will face barriers when attempting to learn online, what those barriers are, and ultimately how we can help individuals in their learning by understanding and ameliorating their particular obstacles.

The survey research reported in this article sought to represent the perceptions of students who differed on 11 independent variables: (a) gender; (b) age; (c) self-reported ethnicity; (d) type of learning institution they attended (e.g., community college, undergraduate, graduate, business/corporate/non-profit, and government/military); (e) ability and confidence with online learning technology (from "not currently using these technologies" to "being comfortable and confident with online learning technologies"); (f) learning effectiveness in the online environment (from "cannot learn as well online," through "no difference between online and traditional classroom," to "learn better online"); (g) learning enjoyment in the online classroom (from "enjoy online learning significantly less," to "enjoy online learning significantly more than the traditional classroom"); (h) the number of online courses completed; (i) the number of online courses dropped; (j) the likelihood of taking a future online course; and (k) whether or not students experienced prejudicial treatment in the traditional classroom due to cultural background, disability, or other personal characteristic. More than 1,000 survey respondents rated the severity of 47 separate student barriers to distance education on a 1–5 Likert scale (from "no barrier" to "a very strong barrier," respectively).

Literature Review

Studies have documented both favorable and unfavorable students' perceptions in distance education. The authors reviewed the literature specifically on students' perceived barriers to online learning and more generally on students' perceived barriers to learning. The goal was to seek out barriers, issues, and success factors from the *students' perspectives* that may affect the learning outcomes (e.g., learning effectiveness, learner attitudes, and motivation). We also searched for indications of what background characteristics and demographics of the learner might affect the outcomes of their online learning. Previous studies have found significant differences in learning, attitudes, motivation, or experiences based on:

(1) *gender* (e.g., Chen, 1986; Teo & Lim, 2000; Young, 2000);
(2) *age* (e.g., Rekkedal, 1983);
(3) *ethnicity* (e.g., Owens, 1998; Branden & Lambert, 1999; Chen, 1999);
(4) ability and confidence with online learning technology (from "not currently using these technologies" to being "comfortable and confident with online learning technologies"). In other words, students' *experiences* with learning technologies (e.g., Koohang, 1989; Hara, 1998; Hara & Kling, 1999);
(5) the *type of learning institution they attend* (community college, undergraduate, graduate, business/corporate/non-profit, and government/military) which may be compared outright, or which may also speak to their prior educational level (e.g., Rekkedal, 1983; Sheets, 1992; Mungania, 2003); and

(6) learning effectiveness in the online environment (from "cannot learn as well online," through "no difference between online and traditional classroom," to "learn better online"), or *self-efficacy*—their perceptions that one can be a successful student online (Mungania, 2003).

To these we added several variables we wanted to explore:

(7) *learning enjoyment in the online classroom* ("enjoy online learning significantly less," to "enjoy online learning significantly more than the traditional classroom");
(8) *number of online courses completed*;
(9) *number of online courses dropped*;
(10) *likelihood of taking a future online course*; and
(11) *whether students experienced prejudicial treatment* in the traditional classroom due to cultural background, disability or other personal characteristics.

Methodology

Two rounds of this survey were conducted. The first is identified here as the "pilot study," and the second round as the "main study."

Pilot Study

The initial survey items were drawn from a review of literature, from previous studies on barriers conducted by Muilenburg and Berge (2001), and from content analyses of selected case studies (Berge & Mrozowski, 2001).

The literature was reviewed for an initial organizing framework. Garland (1993) studied student perceptions of the situational, institutional, dispositional, and epistemological barriers to persistence. Later, Schilke (2001), updating Garland's model of barriers to persistence in distance education, added a technical factor. In his review of the literature, Berge (1995) summarized the responsibilities of the online instructor using four categories: pedagogical, technical, social, and managerial. For the pilot study, and as a matter of convenience, we started with Berge's framework as a grouping mechanism for the barriers identified from the literature. The pilot version of the survey, which contained 61 individual barrier items, was released on the World Wide Web in May, 2003. The survey was programmed to be accessible using standard Web browsers. It was designed so that, as each respondent completed and submitted the survey, the response was captured into an output file and imported into SPSS™ (Statistical Package for the Social Sciences). Respondents were asked to rate each of the 61 barriers on a 1–5 Likert scale.

To announce this pilot survey, we sent individual e-mail messages to personal acquaintances; to the e-mail addresses of thousands of individuals collected from participation lists and membership lists gathered over the years from educational technology, distance education, and training conferences, workshops, seminars, and professional organizations; and to a wide variety of electronic mailing lists in which

the topic of discussion was believed to be related to education, distance education, and technology-enhanced learning. The announcement included background regarding the survey, provided the perspective taken, and asked for volunteers to complete the online survey regarding barriers to distance education. Given this selection process, it is nearly impossible to estimate the rate of return accurately.

Data were collected between May, 2003 and July, 2003. We conducted a factor analysis on the first round of data collected (n = 423), then evaluated the match between the survey constructs and the factors yielded through the statistical analysis. The questions on the pilot survey that did not exceed a 0.4 cutoff for factor loadings were deleted, and a second version of the survey was drafted.

Results of the Pilot Study

A factor analysis of the responses to the pilot resulted in six factors:

(1) *Time/interruptions* is a grouping that has to do with the perceived barriers to students' spending time in learning online and the interruptions that may disrupt a student's learning.
(2) *Infrastructure/support services*. This grouping, from the students' perspective, has to do with issues that the instructor or organization could control.
(3) *Motivation*. This grouping has to do with the psychological processes that cause students to persist in meeting their learning goals.
(4) *Prerequisite skills*. This grouping consists of areas that most students believe they need to have mastered to a certain degree before entering the online classroom.
(5) *Technical*. This grouping refers to students being comfortable with the online system and the software/hardware that is being used in online learning.
(6) *Social*. This grouping refers to the learning environment that is created for learning online which should be friendly and social, and one in which learning is promoted. This suggests promoting human relationships, developing group cohesiveness, maintaining the group as a unit, and in other ways helping participants to work together for a mutual cause.

Conclusions of the Pilot Study

From our analysis of the pilot data, we determined that the Berge model developed in 1995 that listed the responsibilities of *faculty* was not an illuminating way to categorize students' perceptions regarding perceived barriers to online learning.

Main Survey

Instead of the Berge framework, the questions on the main survey were grouped into six parts corresponding to the results of the factor analysis of the pilot study: technical, infrastructure/support services, social, prerequisite skills, motivation, and time/interruptions (see survey at http://www.umbc.edu/oit/phonetree/student_barrier/survey.html).

Modifications to the Pilot Survey

Changes were made to the pilot survey before data collection began for the main study based on the factor analysis and the comments from the pilot study. Fifteen of the original barriers were dropped and one barrier was added that was not in the pilot study, making a total of 47 barriers for the main study. The instructions that accompanied the survey were edited to clarify and explain more fully that the purpose of the survey is to gather data on *students' perceptions*. Also, it was explained that answering "no barrier" could mean any of the following: that the respondents believe the barrier "does not apply to them," or that the respondents "have the skills to deal with this barrier," or that the respondents have "never experienced this barrier," or, if the respondents have never taken an online course, that they "would not experience this barrier" should they take an online class in the future.

Results of the Main Study

Data were collected using the second draft of the survey from July, 2003 to November, 2003. Survey responses with large blocks of missing data were deleted. Additionally, survey responses that had the same rating for every barrier item (e.g., all "no barrier") were judged to have not been mindfully completed and were therefore deleted. After data cleaning, 1,056 valid surveys remained and were analyzed using SPSS. Of the 1,056 survey respondents, 24.0% (n = 253) were 18–24 years of age, 14.6% (n = 154) were 25–31, 15.4% (n = 163) were 32–38, 15.4% (n = 163) were 39–45, 15.1% (n = 159) were 45–51, 11.4% (n = 120) were 52–57, and 4.1% (n = 44) were 58 or above. There were 31% (n = 329) men and 69% (n = 727) women. The ethnicity of respondents included 79.6% (n = 841) white/non-Hispanics, 5.8% (n = 61) black/non-Hispanics, 5.7% (n = 60) Asian/Pacific Islanders, 4.0% (n = 42) Hispanics, 0.4% (n = 5) American Indian/Alaskan Natives, and 4.5% (n = 47) "other." The institution types in which respondents took their most recent online courses were 52.3% (n = 552) from graduate schools, 27.6% (n = 291) undergraduate schools, 13.1% (n = 138) business/corporate/non-profit, 4.2% (n = 45) government/military, and 2.8% (n = 30) community colleges. A little over 6.0% (n = 67) of respondents felt that they had experienced prejudice that significantly affected their learning in the traditional classroom environment due to their ethnicity, or because of personal characteristics such as a disability or their appearance.

When rating their comfort level with online learning technologies, the majority of respondents, 67.7% (n = 715), are comfortable and confident learning online; 23.3% (n = 246) are using e-mail and Internet for personal productivity but are not taking online courses; 7.2% (n = 76) are learning online but feel unsure of their skills; and 1.8% (n = 19) do not use these technologies very often. Of those respondents who have studied online (n = 735), when considering how effectively they feel about their learning online, 33.2% (n = 244) said they cannot learn as well online, 44.0% (n = 323) do not see a difference between their ability to learn online or in a traditional classroom, and 22.8% (n = 168) think they learn better online. For those

who have not taken an online class yet (n = 321), 60.1% (n = 193) predict they would learn poorly online, 32.4% (n = 104) think there would be no difference between learning online or in a traditional classroom, and 7.5% (n = 24) predict they would learn better online. The results were quite similar when asked how well respondents enjoyed learning online. For those who have studied online: 30.9% (n = 227) enjoyed online learning less, 35.2% (n = 258) enjoyed online learning about the same as a traditional classroom; and 33.9% (n = 249) enjoyed online learning more. For those who have never taken an online class, 53.7% (n = 173) predicted they would enjoy online learning less, 34.8% (n = 112) predicted they would like online learning about the same, and 11.5% (n = 37) predicted they would like online learning more.

Respondents ranged from highly experienced online learners (14.4%, n = 152 have completed eight or more online courses) to those who have never taken an online course (33%, n = 347). Most respondents have never dropped an online course (83%, n = 875), 11% (11.1%, n = 117) have dropped one course, 3.2% (n = 34) have dropped two courses, and less than 3% (n = 30) have dropped three courses or more. When asked if they were likely to take a future course online, 5.3% (n = 56) said definitely not, 24.1% (n = 254) said probably not, 35.8 (n = 378) said probably yes, and 34.8% (n = 368) said definitely yes.

Item analyses were conducted on the 47 items hypothesized to assess perceptions of barriers to online learning. Each of the 47 items was correlated with the total score ($r > 0.94$) for Student Barriers (with the item removed); therefore, all 47 items were retained in the scale. The reliability of the Student Barriers to Online Learning Scale was 0.94 as measured by Cronbach's alpha.

Analyses of the Main Study

A principal component factor analysis (PCFA) with Varimax rotation was used to determine the underlying structure of the data. The factorability of the matrix was determined using the Kaiser–Meyer–Olkin Measure of Sampling Adequacy (MSA). In our study, the MSAs for individual variables ranged from 0.89 to 0.97. The MSA for the entire matrix was 0.937. Each of these MSA values is well above the 0.80 meritorious level (Kaiser & Rice, 1974).

Eight factors were identified using the latent root criterion, which is the most common technique for determining the number of factors to extract (Hair, Anderson, Tatham, & Black, 1998). The initial eigenvalues were greater than 1, which are considered significant. Table 1 shows the percentage variance accounted for by each of the variables.

The PCFA of the 47 barriers to distance education listed in the survey resulted in eight factors that accounted for 62.4% of the overall variance.[1] A cutoff for *statistical significance* of the factor loadings of 0.5 was used, because loadings of 0.5 or greater are also considered *practically significant* (Hair et al., 1998). Each item loaded distinctively on one factor; the highest factor loading was separated from its next nearest loading by at least 0.2. Two of the forty-seven barrier items were deleted

Table 1. Total variance explained

Component	Initial eigenvalues		
	Total	% of variance	Cumulative %
Administrative/instructor issues	13.04	13.19	13.19
Social interactions	4.81	9.54	22.73
Academic skills	2.97	8.68	31.41
Technical skills	2.43	8.16	39.56
Learner motivation	2.07	7.46	47.02
Time and support for studies	1.66	6.10	53.12
Cost and access to the Internet	1.29	5.15	58.28
Technical problems	1.06	4.13	**62.41**

because their factor loadings were below the 0.5 cutoff. These items were: (a) lack accreditation or sanction by professional organization, and (b) fear the loss of privacy, confidentiality, or issues with property rights. Table 2 shows the variables loading on each of the components, which produced the following factors: (a) administrative issues, (b) social interactions, (c) academic skills, (d) technical skills, (e) learner motivation, (f) time and support for studies, (g) cost and access to the Internet, and (h) technical problems.

The Appendix defines these terms. It is interesting to note that it appears that the "technical issues" factor in the pilot study broke out into two factors in the main study: access/cost and technical problems. Similarly, the "prerequisite skills" factor from the pilot study split into academic skills and technical skills in the main study.

Overall Priority of Student Barriers

Factor scores were calculated for each of the eight factors identified above. The means for the eight factors were used to rank order the barrier factors from the most severe to least severe (see Table 3). The single most important barrier to students learning online was a lack of social interaction ($M = 2.36$). Administrative/instructor issues, time and support for studies, and learner motivation clustered very closely as the next most severe barriers ($M = 2.05$, 1.91, and 1.91). Less important barriers were technical problems and cost/access to the Internet ($M = 1.70$ and 1.60). Respondents rated a lack of technical skills and academic skills as very low obstacles to learning online ($M = 1.30$ and 1.22).

Differences Among Subgroups

To determine whether particular subgroups of respondents viewed barriers differently, a series of ANOVAs was conducted using factor scores for the barriers as dependent variables. Ten of the eleven independent variables tested affected student

Table 2. Rotated component matrix of factors

	Factors							
Components (45)	1	2	3	4	5	6	7	8
Lack of sufficient academic advisors online	0.750							
Course materials not always delivered on time	0.747							
Instructors do not know how to teach online	0.743							
Lack of clear expectations/instructions	0.729							
Difficulty contacting academic or administrative staff	0.726							
Lack of timely feedback from instructor	0.726							
Lack of access to instructor/expert	0.690							
Lack of support services such as tutors	0.657							
Lower quality materials/instruction online	0.609							
Insufficient training to use the delivery system	0.543							
Class size is not right for online learning	0.510							
Lack of interaction/communication among students		0.828						
Online learning seems impersonal		0.809						
Afraid of feeling isolated		0.803						
Lack of social context cues		0.770						
Lack of student collaboration		0.757						
Prefer to learn in person		0.717						
Lack language skills for online learning			0.816					
Lack writing skills for online learning			0.807					
Lack reading skills for online learning			0.787					
Lack communication skills for online learning			0.770					
Lack typing skills for online learning			0.702					
Shy or lack confidence for online learning			0.660					
Fear new tools for online learning				0.778				
Fear computers and technology				0.725				
Lack online learning software skills				0.706				
Lack skills for using the delivery system				0.689				
Unfamiliar with online learning technical tools				0.648				
Fear different learning methods used for online learning				0.598				

Table 2. *Continued*

Components (45)	Factors							
	1	2	3	4	5	6	7	8
Procrastinate, cannot get started					0.812			
Lack personal motivation for online learning					0.796			
Must take on more responsibility for learning					0.762			
Choose easier, less demanding aspects of assignments					0.678			
Online learning environment is not inherently motivating					0.625			
Fear family life will be disrupted						0.768		
Online learning cuts into my personal time						0.759		
Lack support from family, friends, employer						0.671		
Significant interruptions during study at home/work						0.638		
Insufficient time to learn during online courses						0.531		
Lack adequate Internet access							0.732	
Online learning technology costs too much							0.727	
Needed technology is not available							0.656	
Lack of consistent platforms, browsers, software								0.688
Incompatibility creates technical problems								0.673
Lack technical assistance								0.623

Note. Extraction method: principal component analysis. Rotation method: Varimax with Kaiser normalization. Cutoff = 0.50. Factors: (1) Administrative/instructor issues, (2) social interactions, (3) academic skills, (4) technical skills, (5) learner motivation, (6) time and support for studies, (7) cost and access to the Internet, and (8) technical problems.

ratings of barriers to online learning significantly ($p < 0.05$): gender, age, ethnicity, type of learning institution, self-rating of online learning skills, effectiveness of learning online, online learning enjoyment, the number of online courses completed, the likelihood of taking a future online course, and persons who reported experiencing prejudicial treatment. The only variable that did not show significant differences among the means was the number of courses dropped, and this variable contained too few people in most categories to run an ANOVA.

To determine the strength of association of the independent variables to each of the eight barrier factors, eta squared was calculated for each ANOVA. Eta squared

Table 3. Priority of student barriers to online learning

Barrier factors (n = 1,056)	Means	*SD*
Social interactions	2.36	1.07
Administrative/instructor issues	2.05	0.80
Time and support for studies	1.91	0.79
Learner motivation	1.91	0.93
Technical problems	1.70	0.73
Cost and access to the Internet	1.60	0.73
Technical skills	1.30	0.50
Academic skills	1.22	0.50

indicates the proportion of variance in the dependent variable that is explained by the independent variable, and values "of .01, .06, and .14 are by convention interpreted as small, medium, and large effect sizes, respectively" (Green & Salkind, 2003, p. 162). A summary of the eta squared values for the significant ANOVA tests is found in Table 4.

Discussion and Implications

There are many significant relationships in this data set that need to be explored. This article will focus on the four most critical barriers previously identified: (a) social interaction, (b) administrative/instructor issues, (c) learner motivation, and (d) time/support for studies. The focus is also limited in this paper to the five independent variables that have the most effect on the above four barriers. These are variables with medium to large effect sizes (see bold print in Table 4): (a) ability and confidence with online learning technology, (b) effectiveness of online learning, (c) online learning enjoyment, (d) online courses completed, and (e) the likelihood of taking a future online course. For ANOVAs that were significant, post hoc pair-wise comparisons were conducted using t tests with Bonferroni correction.

Ability and Confidence with Online Learning Technology

Respondents with the highest level of comfort and confidence using online learning technologies perceived significantly fewer barriers for social interaction, administrative/instructor issues, learner motivation, and time and support for studies than the other three groups who were unsure of their skills or were not using online learning technologies. Differences among the less confident groups and those not using online learning technologies were not significant. Means for the various groups are presented in Table 5.

The association was moderate between ability and confidence with online learning technologies and the dependent variables social interaction, administrative/instructor issues, and learner motivation (η^2 = 0.116, 0.064, and 0.124, respectively).

Table 4. Eta squared values for significant ANOVAs (factors by independent variables)

Independent variables	Barrier factors (from most to least important)							
	Social interaction	Admin/ instr issues	Learner motivation	Time and support	Technical problems	Cost and access	Technical skills	Academic skills
Gender Men rate these factors higher than women		0.007		0.004				
Age Barriers perceived decrease as age increases	0.049	0.034	**0.112**	0.025		0.022		
Ethnicity Asians and Hispanics rate barriers higher. Whites and blacks rate barriers lower	0.014	0.033	0.025	0.014		0.030	0.014	0.046
Learning institution Undergrads rate barriers higher. Corporate and graduate students rate barriers lower	0.014		0.046					
Ability and confidence with online learning technology Those learning online but unsure of skills rate barriers highest … even higher than those not yet learning online	**0.116**	**0.064**	**0.124**	0.053	0.030	0.027	**0.096**	0.040
Effectiveness at online learning Those who say they don't, or predict they wouldn't, learn well online rate barriers highest	**0.378**	**0.169**	**0.213**	**0.079**	0.038	0.045	**0.074**	0.016
Online learning enjoyment Those who don't enjoy online learning rate barriers high. Those who *predict* they wouldn't enjoy online learning rate barriers highest	**0.397**	**0.153**	**0.161**	0.046	0.028	0.041	0.053	

Table 4. *Continued*

Independent variables	Barrier factors (from most to least important)							
	Social interaction	Admin/ instr issues	Learner motivation	Time and support	Technical problems	Cost and access	Technical skills	Academic skills
Number of online course completed Those who have completed NO online courses rate barriers higher. Ratings decrease as more courses are completed	**0.133**	**0.068**	**0.112**	0.030		0.042	0.047	0.020
Likelihood of taking a future online course Likelihood of taking a future course increases as barriers decrease	**0.261**	**0.088**	**0.146**	0.028	0.008	0.022	0.029	
Experienced prejudice in face-to-face classes People who experienced prejudice rated these barriers higher	0.005	0.005		0.009		0.009		0.017

Table 5. Barrier means by ability and confidence with online learning technology

Response category	Number of cases	Social interaction	Admin/instr issues	Learner motivation	Time and support
I do not use online learning technology (such as e-mail and the Internet) very much	19	3.32	2.58	2.15	2.12
I use online learning technologies such as e-mail and the Internet for my own personal productivity but not so much for education or training purposes	246	2.81	2.32	2.41	2.12
I am learning online, but I am unsure of my skills when doing so	76	2.95	2.31	2.35	2.33
I have learned, or I am learning, online and feel comfortable and confident when I do so	715	2.11	1.91	1.68	1.79

Ability and confidence with online learning technologies had a modest association with time and support for online learning ($\eta^2 = 0.053$).

Effectiveness of Online Learning

For the question related to a respondent's effectiveness at online learning, students who had taken an online class were asked to compare how well they learned online to their learning in a traditional classroom. If students had never taken an online course, they were asked to predict how well their learning online would compare to a traditional class. A significant relationship exists for this independent variable across each of the four dependent variables: students who indicated they cannot learn well online (or predicted a lack of success) had the highest barrier ratings. Those who indicated their learning online was equal to the traditional classroom (or predicted it would be the same) had a moderate level of barriers. Students who felt they learned better online had the lowest mean for the barrier factors. Interestingly, for each level of comparison (experienced poor learning vs. predicted poor learning, experienced equal learning vs. predicted equal learning, and experienced better learning vs. predicted better learning) students who had not taken online classes predicted higher barriers than students who had taken classes. This comparison was statistically significant in all cases, except for comparisons with level 6 (students predicting better learning online), possibly due to the relatively small number of respondents in this group ($n = 22$). Means for the various groups are presented in Table 6.

There was a strong association between effectiveness of online learning and social interaction ($\eta^2 = 0.378$), administrative/instructor issues ($\eta^2 = 0.169$), and learner motivation ($\eta^2 = 0.213$). Effectiveness of online learning had a moderate effect with time and support for online learning ($\eta^2 = 0.079$).

Table 6. Barrier means by effectiveness of online learning

Response category	Number of cases	Social interaction	Admin/instr issues	Learner motivation	Time and support
I cannot learn as well online as I can in the classroom with other learners and the instructor	244	3.03	2.29	2.20	2.12
I really don't see much difference in my learning in an online learning environment compared to being in the classroom with other learners and the instructors	323	1.83	1.74	1.53	1.73
I learn better through online learning compared to being in the same room as other learners and the instructor	168	1.59	1.70	1.43	1.69
While I have never completed an online class, I predict I would not learn as well online as I would in the classroom with other learners and the instructor	193	3.22	2.55	2.58	2.24
While I have never completed an online class, I predict I would not see much difference in my learning in an online learning environment compared to being in the classroom with other learners and the instructor	104	2.19	2.01	1.87	1.79
While I have never completed an online class, I predict I would learn better online compared to being in the classroom with other learners and the instructor	24	1.84	2.11	2.11	1.74

Online Learning Enjoyment

The rating scale for online learning enjoyment was similar to the effectiveness of online learning scale described above. Students were asked to compare how much they enjoyed learning online with learning in a traditional classroom. If students had never taken an online course, they were asked to predict how well they would like learning online. The same trend exists for online learning enjoyment, as was described above for effectiveness of online learning. Students who did not enjoy learning online as much as they enjoy learning in a traditional class (or predicted they would not) had significantly higher barrier ratings. Those who enjoyed learning online equally with a traditional classroom (or predicted it would be the same) had a moderate level of barriers. The lowest barrier ratings were from students who enjoyed online learning more. Again, barriers were

higher at each level of enjoyment when comparing students who predicted versus students who rated their actual experiences with online learning. This relationship was statistically significant for comparisons within the social interaction, administrative/instructor issues and learner motivation factors, except when using level 6 (students predicting better learning online). Although the same pattern is evident in the time and support factor, many of the pair-wise comparisons were not statistically significant. Means for the various groups are presented in Table 7.

The strongest association found in this study was between online learning enjoyment and social interaction ($\eta^2 = 0.397$). Administrative/instructor issues ($\eta^2 = 0.153$) and learner motivation ($\eta^2 = 0.161$) were also strong relationships. Online learning enjoyment had a small effect with time and support for online learning ($\eta^2 = 0.046$).

Table 7. Barrier means by online learning enjoyment

Response category	Number of cases	Social interaction	Admin/instr issues	Learner motivation	Time and support
I enjoy the online learning experience significantly less	227	3.06	2.18	2.11	2.02
I really don't see much difference in my enjoyment between learning online and in the classroom with other learners and the instructor	258	1.89	1.81	1.58	1.85
I enjoy the online learning experience significantly more	249	1.61	1.74	1.52	1.68
While I have never completed an online class, I predict I would enjoy the learning experience significantly less online compared to being in the classroom with other learners and the instructor	173	3.32	2.64	2.52	2.16
While I have never completed an online class, I predict I would not see much difference in my enjoyment of the online learning environment compared to being in the classroom with other learners and the instructor	112	2.37	2.07	2.17	2.03
While I have never completed an online class, I predict I would enjoy the learning experience significantly more online than being in the classroom with other learners and the instructor	37	1.74	2.07	1.91	1.75

Number of Online Courses Completed

Respondents to this survey who had never taken an online course (n = 347) rated each of the factors as significantly more severe barriers than any of the other groups. Although the differences from level to level are not usually statistically significant, there is also a visible trend in the data that as people complete more online courses, ratings of the barriers decrease. Means for the various groups are presented in Table 8. It makes sense that perceived barriers decrease as experience with online learning increases. What is most interesting is the huge drop in barriers perceived after completing just one course, where fear of the unknown appears to be important.

The number of online courses completed had a moderate effect on barriers perceived in social interaction (η^2 = 0.133), administrative/instructor issues (η^2 = 0.068), and learner motivation (η^2 = 0.112). There was a small association between the number of online courses completed and time and support for online learning (η^2 = 0.030).

Likelihood of Taking a Future Online Course

Table 9 presents the means for each dependent variable by subgroups. For the factors social interaction, administrative/instructor issues, and learner motivation there is a statistically significant pattern: as the barriers perceived decrease, the likelihood of taking a future online course increases. Although not statistically significant at each level, the same pattern holds true for time and support for studies.

The highest mean barrier rating (M = 3.66) found in the study was for the social interaction barrier when considering the likelihood of voluntarily taking a future online course. Clearly, overcoming the lack of social interaction in online courses is a major contributor to the decision to continue with online learning. The likelihood of voluntarily taking a future online course was related strongly to social interaction barriers (η^2 = 0.261) and problems with learner motivation (η^2 = 0.146). Administrative and instructor issues (η^2 = 0.088) had a moderate effect size. There was a

Table 8. Barrier means by number of online courses completed

Response category	Number of cases	Social interaction	Admin/instr issues	Learner motivation	Time and support
No online courses completed	347	2.82	2.32	2.29	2.07
1 online course completed	158	2.46	1.89	1.99	1.91
2 online courses completed	119	2.24	1.98	1.80	1.86
3 online courses completed	95	2.20	1.99	1.77	1.89
4 online courses completed	83	2.23	2.08	1.73	1.95
5–7 online courses completed	102	1.97	1.78	1.54	1.73
8–10 online courses completed	47	1.82	1.84	1.55	1.73
11–13 online courses completed	38	1.79	1.67	1.44	1.89
14 or more online courses completed	67	1.60	1.95	1.41	1.62

Table 9. Barrier means by likelihood that I will voluntarily take a future online course

Response category	Number of cases	Social interaction	Admin/instr issues	Learner motivation	Time and support
Definitely not	56	3.66	2.54	2.50	2.12
Probably not	254	2.98	2.35	2.38	2.09
Probably yes	378	2.30	2.00	1.89	1.91
Definitely yes	368	1.79	1.81	1.51	1.76

small association between the lack of time and support for online learning and the likelihood of taking a future online course ($\eta^2 = 0.028$).

A Cautionary Thought for Further Research

What does this research say to distance educators? This research design used barriers as the dependent variables, which has certain implications for interpretation of the findings. For instance, a lack of social interaction was the most severe barrier as perceived by students overall. The findings here are that social interaction is strongly related to online learning enjoyment, effectiveness of learning online, and the likelihood of taking another online class. Therefore, it seems logical that improving social interaction in online learning would lead to a more effective and enjoyable educational experience—one that students would want to repeat.

However, this research design does not speak to causation. It may be that increasing social interaction would lead to educational benefits. Conversely, it may be that because students enjoy online learning, or believe that online learning is as effective as in-person education, their social interaction is improved. Perhaps certain types of students simply don't need much social interaction to find learning enjoyable and effective. Several barrier factors and independent variables in this study are open to this type of speculation regarding the direction of causation. For those distance educators and researchers interested in reducing student barriers to distance education and improving online learning, further investigation of causation may be a useful line of research.

Additionally, if one looks at the number of classes that a student has taken, there is a marked drop-off of perceived barriers for students who have taken only one course compared to those who have taken no online classes. This may be because people who take online classes are those who perceive lower barriers before taking any online classes. Or it may be that after experiencing just one online class most students either overcome many barriers or find out that they had overestimated the barriers before taking any online courses. The point is, this study did not show causes. We can show relationships among the barriers and the independent variables we have chosen. To show what causes these relationships, further research would need to be done using time-series and probably some qualitative methods that would allow the researcher to determine the causation within these relationships.

Note

1. The 62.4% of overall variance accounted for was deemed to be satisfactory. Hair et al. (1998) state "… in the social sciences, where information is often less precise, it is not uncommon to consider a solution that accounts for 60% of the total variance (and in some cases even less) as satisfactory" (p. 104).

Notes on Contributors

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Appendix

Definitions of the Eight Barrier Factors

(1) *Administrative/instructor issues*. Students perceive barriers that administrators and instructors control, such as course materials not always being delivered on time, lack of sufficient academic advisors online, and lack of timely feedback from the instructor.

(2) *Social interactions*. These are obstacles to online learning that students perceive as being caused by a lack of interaction with peers or the instructor, such as the lack of student collaboration online, the lack of social context cues, or their being afraid of feeling isolated in online courses.

(3) *Academic skills*. This factor concerns respondents' perceived barriers to online learning due to their lack of academic skills in such areas as writing, reading, or communication.

(4) *Technical skills*. This factor concerns respondents' perceived barriers to online learning due to their lack of technical skills such as fearing new tools for online learning, lack of software skills, or their unfamiliarity with online learning technical tools.

(5) *Learner motivation*. Respondents answered whether they had certain characteristics that would affect their motivation in online courses such as whether they

procrastinate, choose easier aspects of an assignment to complete, or feel the online learning environment is not inherently motivating.

(6) *Time and support for studies*. This factor concerns the respondents' perspectives on whether a lack of time or support from family, friends, or people in the workplace causes barriers to their online learning.

(7) *Cost and access to the Internet*. This factor concerns whether the respondents find access to the Internet too expensive, fear the loss of privacy, confidence, or property rights, or otherwise find access to the Internet limited to the point of raising barriers to them.

(8) *Technical problems*. This factor concerns such things as a lack of consistent platforms, browsers, and software, or the lack of technical assistance that causes obstacles to online learning.